JOURNAL

of the

American Veterinary Medical Association

FORMERLY

AMERICAN VETERINARY REVIEW

(Original Official Organ U. S. Vet. Med. Assn.)

EDITED AND PUBLISHED FOR

The American Veterinary Medical Association

CONTENTS

Editorial	1
Papers:	303
Internal Parasites of Dogs and Cats in the United States and Tree tments for Removing These Parasites—Maurice C. Hall	11
Some Troubles Met in Immunizing Against Hog Cholern . R. Steel	52
The Use of the Stomach Tube in Swine Practice—C. E. Juhl	60
Otitis Media—W. F. Guard	64
Traumatism of the Abdominal and Thoracic Cavities—R. M. Phelan	75
Concerning Sterility—S. Sisson	78
Rabies Vaccine Canine, Single Dose Treatment—John Reichel and J. E. Schneider	83
Studies on Infectious Enteritis of Poultry Caused by Bacterium Coli Com- munis—C. C. Palmer and H. R. Baker	85
Acriflavine - D. H. Udall	97
Clinical and Case Reports:	32
Suspected Nitrate of Potash Poisoning-J. A. Webb	99
Blackleg Aggressin in Sheep-Hadleigh Marsh	100
Association News:	
Proceedings of the Fifty-ninth Annual Meeting, American Veterinary	
	02
	11
Communications	28
Miscellaneous 1	32
Necrology	33
Personal	34

THE JOURNAL OF THE AMERICAN VETRHINARY MEDICAL ASSOCIATION is issued the first of each month. Manus vipts and copy for insertion should be as nearly perfect as possible for the printer and should be received by the tenth of the preceding month to insure insertion in the next month's issue. Volumes begin in April and October.

Communications relating to publication, subscription, advertisements and remittances for the Journal of the American Veterinary Medical Association, as well as matters pertaining to the American Veterinary Medical Association and membership, should be sent to Dr. H. Preston Hoskins, Secretary-Editor, 735 Book Bldg., Detroit, Mich.

\$4.00 per annum

Foreign \$5.00; Canada \$4.25

Single Copies 40 cts. in U. S.

Entered as Second-Class Matter, March 15, 1923, at the Post Office at Detroit, Mich., under Act of March 3, 1879. Acceptance for mailing at special rate of postage provided for in Section 1103, Act of October 3, 1917; authorised October 28, 1918.

Z-S BACTERINS

For better results and greater satisfaction insist on Z-S Biologics. Z-S Bacterins are heavily concentrated, always fresh and made under the personal supervision of expert Bacteriologists.



You can use the following now:

BOVINE HEMORRHAGIC SEPTICEMIA BACTERIN,

BOVINE MASTITIS STREPTOCOCCUS BACTERIN.

CALF SCOUR MIXED BACTERIN,
EQUINE INFLUENZA MIXED BACTERIN,
EQUINE NAVEL-ILL MIXED BACTERIN,
SWINE MIXED INFECTION BACTERIN.

Prices greatly reduced on all Biologics.

The Zell-Straub Laboratories take pleasure in announcing to the veterinary profession the addition of some valuable pharmaceutical products to their line. Try the new Z-S Worm Capsules.

In bottles of 100 \$ 2.50
In bottles of 500 10.00
In bottles of 1000 18.00

Order a supply TODAY.

Zell-Straub Laboratories

5520 Norwood Park Ave.

Chicago, Ill.

FLAVISOL is made only by the Zell-Straub Laboratories. Have you a supply on hand? Include a pint with your order for Biologics.



W

pi = V =

bi In er T

pi hi m gi m

ti si ai te

JOURNAL

OF THE

American Veterinary Medical Association

FORMERLY AMERICAN VETERINARY REVIEW

(Original Official Organ U. S. Vet. Med. Ass'n.) H. Preston Hoskins, Secretary-Editor, 735 Book Building, Detroit, Mich.

W. H. WELCH, President, Lexington, Ill.

M. JACOB, Treasurer, Knoxville Tenn.

Executive Board

GEO. HILTON, 1st District; T. E. MUNCE, 2nd District; S. E. BENNET, 3rd District J. A. Kiernan, 4th District; C. E. Cotton, 5th District; B. W. Conrad, 6th District; Cassius Way, Member at Large, Chairman.

Sub-Committee on Journal

S. E. BENNETT

J. A. KIERNAN

The American Veterinary Medical Association is not responsible for views or statements published in the JOURNAL, outside of its own authorized actions.

Reprints should be ordered in advance. Prices will be sent upon application.

Vol. LXIII, N. S. Vol. 16

April, 1923

No. 1

VETERINARY BIOLOGICS

The feeling seems to be rather prevalent among practicing veterinarians that the present licensing system for veterinary biological products, as enforced by the Federal Bureau of Animal Industry, falls far short of what it should be. Some veterinarians even go so far as to say that it has shot by the mark entirely. This is plainly an exaggeration and an unfair criticism of the veterinarians in the Bureau charged with carrying out the provisions of the serum-virus-toxin law.

We have but to look at the improvements in the methods of preparing a single biological product—anti-hog cholera serum—that have come into practice during the past ten years, to see that much good has followed Government supervision, although to give the Bureau credit for all of these improvements would be manifestly unfair to certain serum-producers, who have shown conspicuous initiative in producing a better product.

One of the criticisms most frequently voiced is that no distinction is made between the really meritorious biological products, such as anti-hog cholera serum, tetanus antitoxin and tuberculin, and those of seriously questionable merit, such as abortion bacterin, chicken-pox vaccine and the so-called "mixed infection" biologics. Veterinarians contend that the Government should

have the power to classify all products licensed. For example, the simplest classification that has been suggested is one that would place every biological product in one of three classes, namely:

A. Those which have been tried and proven.

B. Those which are purely experimental.

C. Those which have been tried and found wanting.

In spite of the fact that most veterinarians know that a veterinary license for a biological product carries with it no guarantee of the value of the product licensed, yet it is commonly stated in defense of certain of these products that they are duly licensed by the Bureau of Animal Industry, the implication being that the Government would license only worthy and unquestionable products. There is the other side of the story, of cousre. If the Bureau withholds a license for a product until such time as the manufacturer may present evidence of the efficiency of the product in question, there is immediately heard a cry of unjust discrimination, or of stifling private enterprise, and even of hindering the employment of a product which may be highly valuable in preventing or curing some animal disease.

At the present time a manufacturer may apply for a license for an experimental biological product, and if the license is granted he finds that it is no different from the licenses that are granted for products that have been in use for many years. If the manufacturer wishes to try out the product experimentally, before applying for a license for it, he must confine his experimental use of the product within the limits of the state in which it is manufactured. He can not legally send a drop of it, even without charge and plainly marked for experimental use, to a veterinarian in an adjoining state, without first obtaining a license.

From the very nature of some of these biological products, and more especially the nature of the diseases they are designed to combat, it appears to be very difficult, if not impossible, to evaluate them properly. Time, and the weight of public opinion, must be the deciding factors, and until such time as a biological product can be placed definitely in either class A or class C, it should remain in the experimental class B.

Standardization of biological products, both as to name and composition, particularly the bacterial suspensions, both living and dead, is sorely needed. This is possible of accomplishment without robbing any manufacturer of his individuality. It can be done without "leveling quality", which is the most commonly

heard criticism of any further move in this direction. It appears absolutely ridiculous, in the case of certain bacterins, for there to be such a wide variation in the number of organisms in products of the same name, prepared by different manufacturers.

For a time it seemed to be the goal of every new laboratory that entered the field to have a higher bacterial count (in the advertising literature, even if not in the product) than any other competitor. Apparently the saturation point has been reached, however. Just as long as the present chaotic state of affairs is allowed to exist, veterinarians are going to doubt seriously the honesty or the ability of the manufacturer, as well as the value or the efficiency of the products that he places on the market.

Whether it is the function of the American Veterinary Medical Association to take the lead in this matter, and attempt to bring order out of chaos, so that the practicing veterinarian may feel that he has some real substantial backing, when he uses or refuses to use a certain biological product, is for the Committee on Policy to discuss, with a view to making a definite recommendation to the Association.

WE ARE BUSY

We were late with the March issue, but we have gained a few days with this number. February was a short month, and our first issue happened to be the index number of Volume 62, so we felt we had some excuse for being a little late. It will take some little time for us to learn all the ropes and get things to running smoothly. We are just beginning to realize some of the difficulties that our predecessors, former editors and former secretaries, had to contend with. We are busy, very busy, and happy, too. Happy in the realization that there is lots of real, worth-while work to do, and busy trying to get some small part of it done. It is gratifying and encouraging to receive the sincere expressions of confidence that have come our way, the helpful suggestions and the kind offers of assistance, all of which contribute to make us think that

Every day,
In every way,
The A. V. M. A.
Is getting better and better.

RECLASSIFICATION OF FEDERAL VETERINARIANS

After consideration of the reclassification bill by the United States Senate for a period of more than a year, the Bureau of Animal Industry of the Department of Agriculture is glad to have the opportunity of stating that its veterinarians throughout the country are at last to be reclassified according to the quality of the work performed and the responsibilities of the positions occupied by them. The same rules for determining the compensation to be established initially for the employees in the field service are to be observed as in the case of employees in the District of Columbia. A Personnel Classification Board, established by the act, which consists of the Director of the Budget Bureau, a member of the Civil Service Commission, and the Chief of the United States Bureau of Efficiency, or an alternate for each of those services, is required by the law to review and revise, if necessary, the allocations of the various positions as determined upon by the head of the Department, and the action of that board is made final. The reclassification law also requires this board to make a survey of the field services and report to Congress at its regular session in December next schedules of positions, grades, and salaries for such services. This report is to include a list, prepared by the head of the Department, allocating all field positions and fixing the proposed rate of compensation of each employee thereunder. The law further requires that the estimates for the fiscal year 1924, which are presented to Congress in December next, shall conform to the classifications provided in the law and that the rates of salary in the compensation schedules shall not become effective until July 1, 1924.

The following compensation schedule for the professional and scientific service, which includes veterinarians, is specifically provided by the law:

PROFESSIONAL AND SCIENTIFIC SERVICE

The professional and scientific service shall include all classes of positions the duties of which are to perform routine, advisory, administrative, or research work which is based upon the established principles of a profession or science, and which requires professional, scientific, or technical training equivalent to that represented by graduation from a college or university of recognized standing.

Grade one, in this service, which may be referred to as the junior professional grade, shall include all classes of positions the duties of which are to perform, under immediate supervision, simple and elementary work requiring professional, scientific, or technical training, as herein specified,

but little or no experience.

The annual rates of compensation for positions in this grade shall be \$1,860, \$1,920, \$2,000, \$2,100, \$2,200, \$2,300, and \$2,400.

Grade two, in this service, which may be referred to as the assistant

eigl

professional grade, shall include all classes of positions the duties of which are to perform, under immediate or general supervision, individually or with a small number of subordinates, work requiring professional, scientific, or technical training as herein specified, previous experience, and, to a limited extent, the exercise of independent judgment.

The annual rates of compensation for positions in this grade shall be

\$2,400, \$2,500, \$2,600, \$2,700, \$2,800, \$2,900, and \$3,000.

Grade three, in this service, which may be referred to as the associate professional grade, shall include all classes of positions the duties of which are to perform, individually or with a small number of trained assistants, under general supervision but with considerable latitude for the exercise of independent judgment, responsible work requiring extended pro-fessional, scientific, or technical training and considerable previous exper-

The annual rates of compensation for positions in this grade shall be

\$3,000, \$3,100, \$3,200, \$3,300, \$3,400, \$3,500, and \$3,600.

Grade four, in this service, which may be referred to as the full professional grade, shall include all classes of positions the duties of which are to perform, under general administrative supervision, important specialized work requiring extended professional, scientific, or technical training and experience, the exercise of independent judgment, and the assumption of responsibility for results, or for the administration of a small scientific or technical organization.

The annual rates of compensation for positions in this grade shall be \$3,800, \$4,000, \$4,200, \$4,400, \$4,600, \$4,800, and \$5,000, unles a higher

rate is specifically authorized by law.

Grade five, in this service, which may be referred to as the senior professional grade, shall include all classes of positions the duties of which are to act as assistant head of a large professional or scientific organization, or to act as administrative head of a major subdivision of such an organization, or to act as head of a small professional or scientific organization, or to serve as consulting specialist, or independently to plan, organize, and conduct investigations in original research or development work in a professional, scientific, or technical field.

The annual rates of compensation for positions in this grade shall be \$5,200, \$5,400, \$5,600, \$5,800, and \$6,000, unless a higher rate is specifical-

ly authorized by law.

Grade six, in this service, which may be referred to as the chief professional grade, shall include all classes of positions the duties of which are to act as the scientific and administrative head of a major professional or scientific bureau, or as professional consultant to a department head or a commission or board dealing with professional, scientific, or technical problems.

The annual rates of compensation for positions in this grade shall be \$6,000, \$6,500, \$7,000, and \$7,500, unless a higher rate is specifically

authorized by law.

Grade seven, in this service, which may be referred to as the special professional grade, shall include all classes of positions the duties and requirements of which are more responsible and exacting than those described in grade six.

The annual rate of compensation for positions in this grade shall be

\$7,500, unless a higher rate is specifically authorized by law.

The February Journal recorded the fact that eleven members of the Association had already paid up their dues one year in The question was asked: "Who is next?" Seven advance. members responded, and the number thereby increased to eighteen.

PUBLICITY

Most veterinarians agree that the one thing most sorely needed by the veterinary profession today is publicity. Everybody says that we have been hiding our light under a bushel. That those members of the Association who attended the St. Louis meeting were aware of the situation, was evidenced by the prompt approval which they gave to the recommendation of the Budget Committee for a fund to be devoted to publicity purposes. It was recognized that the amount appropriated on this occasion was small and only the beginning. This fact was brought to our attention in a very marked way, when we recently consulted a representative of a national farm paper, relative to rates for space. We asked for a quotation on one insertion of a quarter-page ad in his paper. The cost quoted for this one ad was considerably over one-half of the appropriation made by our Budget Committee. So much for the high cost of advertising.

We are in a position to know that in the very near future one of our leading biological firms will inaugurate a nation-wide advertising campaign in favor of the veterinarian. We have had the privilege of examining the copy of six ads, one of which will appear every three weeks, occupying the space of almost one-half page, in an agricultural paper which has a weekly circulation of approximately one million. These six ads will bear the caption, "What Would America Be Without Its Veterinary Profession?" Each of the six ads will discuss some important phase of the veterinary profession, and each will conclude with the following paragraphs:

"It is imperative that the veterinarian be encouraged, and the greatest encouragement you can give him is to use his services.

"The livestock industry is the cornerstone of America's agricultural wealth—and the veterinary profession is its greatest safequard,"

We know approximately what the advertising bill will be for this publicity. It is a staggering amount, and far beyond anything that the Association would be able to expend in a similar effort at this particular time. We are indeed pleased to know that this splendid work has been undertaken. We cannot commend it too highly.

Di Bo Hi the rea the wil Di As of the me anı the dist ary as imp two

vote
46 n
to a
their
mat
been
our
of th

tha

mee

ball

writ

mai

and

All part it in head

EXECUTIVE BOARD ELECTIONS

District No. 1: We are pleased to announce the reelection of Dr. George Hilton, of Ottawa, as a member of the Executive Board of the A. V. M. A., for District No. 1 (Canada). Dr. Hilton completed his first term of office in August 1922, and the election which has just been held in District No. 1, should really have been held prior to the St. Louis meeting. The fact that elections in the past have really been held one year late, will explain why it has been necessary to hold elections in Districts Nos. 2 and 3, so soon after the election in District No. 1. As a matter of fact, the terms of office of the present members of the Board from Districts Nos. 2 and 3 will not expire until the close of the meeting in Montreal, but in order that the members-elect may qualify and take office at the close of the annual meeting, the Constitution and By-Laws provides for their nomination and election prior to the annual meeting.

Districts Nos. 2 and 3: Nominating ballots for these two districts were mailed from the office of the Secretary on February 27th, which is exactly six months before the annual meeting as provided in the Constitution and By-laws, which rather implies that the polls for nominations should remain open for two months. Section 1 of Article 10 of the By-laws provides that nominations be filed at least four months before the annual meeting, and another period of two months for filing election ballots is implied in the same Article. At the time that this is written (over three weeks after the nominating ballots were mailed), only 174 have been returned from District No. 2, and only 165 from District No. 3. These 339 ballots show the votes to be distributed between 34 members in District No. 2, and 46 members in District No. 3. We would take this opportunity to ask those members in these districts who have not yet filed their nominating ballots, to do so just as soon as possible. The matter of electing the members of our Executive Board has been referred to as being one of the most democratic features of our organization, and for our members to fail to take advantage of this fact is rather surprising.

All that was said at St. Louis, both pro and con, is now a part of A. V. M. A. history, but we did think that it was rubbing it in a little bit recently, when a friend introduced us as "the head of the horse-doctors' union."

DR. GEORGE HILTON A Biographical Sketch

Dr. George Hilton, who has just been reelected as a member of the Executive Board of the American Veterinary Medical Association, for District No. 1 (Canada), was born in 1872, of English parentage, at Verchotor, Government of Oufa, Russia. He was educated at Grosvenor House School, Lerton Bedfordshire, and the Higher Grade Board School, Bolton Lancashire, England. With his parents, he came to Canada in 1888, and, engaged in mixed farming, at Headingly, Manitoba. He



GEORGE HILTON, V. S.

was Honor Graduate of the Ontario Veterinary College in 1897, and immediately took up practice at Portage La Prairie, Manitoba. The following year he entered into partnership with Dr. J. G. Rutherford.

During the time that he was located at Portage La Prairie, Dr. Hilton was a Director of the Lakeside Agricultural Society, Secretary-Treasurer of the Island Park Turf Club and an alderman in the city council. In 1902 Dr. Hilton was appointed assistant to Dr. J. G. Rutherford, then Veterinary Director-

General of Canada, with title of Chief Veterinary Inspector, in the Department of Agriculture, with headquarters at Ottawa, a position which he still holds. From 1917 to 1921 he was a Director of the Central Canada Exhibition Association, and Chairman of the Dog Show Committee.

Dr. Hilton is an Honorary Member of the Manitoba, Sas-katchewan and Alberta Veterinary Associations. He has been President of the Central Canada Veterinary Association since 1914. He is a member of the Advisory Board of the Canadian Veterinary Record and a member of the United States Livestock Sanitary Association. In 1918 he was elected to the Executive Board of the American Veterinary Medical Association, at the first election held for that purpose under the present constitution. He was Chairman of the Board during the year 1921-1922. He is Treasurer of the Andrew Smith Memorial Fund.

AN IMPORTANT DECISION

A law-suit which is of great interest to the veterinary profession and live-stock raisers, as well as to producers of biologics, was tried last month at Des Moines, Iowa. The plaintiff was William Balhorn, an Iowa stock-raiser and the defendant, Pitman-Moore Company, of Indianapolis.

Balhorn's hogs were immunized, in July 1921, with serum and virus produced by Pitman-Moore Company, and sickened in September. Two veterinarians were of the opinion that the trouble was hog cholera, while two others, including a representative of the Bureau of Animal Industry, were unable to diagnose cholera.

The plaintiff alleged that his trouble was caused by impotent serum or virus, and prosecuted his claim for damages on the theory of implied warranty. The attorneys for the plaintiff claimed that since anti-hog cholera serum and hog cholera virus were made for vaccination of swine and the prevention of cholera, there is, in consequence, an implied warranty when such products are sold. At the completion of the plaintiff's evidence, the presiding judge instructed the jury to return a verdict in favor of the defendant, which was done without hearing any of the defendant's evidence. The plaintiff was unable to show negligence of the defendant in the production, ware-housing or handling of the products used, as is required by law.

From the decision in this case, it is evident that the law will

sustain a claim for damages against a producer of biologic, only where it can be shown that the producer has been negligent in the production, ware-housing or handling of his products, and that courts will not look upon the sale of biological products as implying a guaranty of the results from their use. It is also evident that if vaccinated swine develop subsequent sickness, whether cholera or not, this alone does not constitute proof that the products are faulty in potency, virulence or purity.

KEEP MONTREAL IN MIND

The dates for our Montreal convention have been definitely and officially decided—they are August 27, 28, 29, 30 and 31, 1923. The official headquarters selected by the Local Committee on Arrangements will be the New Mount Royal Hotel, which is said to be the largest hotel in the British Empire, and which was opened to the public only a few months ago. If we may judge by the activities of the passenger agents of the various railroads throughout the country, our members will not have a chance to forget that we are going to have a convention in Montreal, in August. We have supplied lists of our members in different sections of the country, to about a dozen of the railroads, for solicitation purposes. No official route has been selected. You have known for sometime where the place of meeting would be. Now do not forget the dates.

AN APOLOGY

We expected to make some mistakes in our first number of the Journal, but we hardly expected to make such a serious mistake as to credit a paper to the wrong author. However, as we review the facts in the case, we do not feel that we were entirely responsible. The paper entitled, "Observations on the Treatment of Purpura Hemorrhagica" was forwarded by our good friend, Dr. E. R. Steel, of Grundy Center, Iowa. The original manuscript contained nothing whatever to indicate the authorship. We assumed that it had been written by Dr. Steel, but we have been advised by him, since the publication of the paper, that it was written by Dr. L. E. Smith, of Jefferson, Iowa. We hereby make this public apology to Dr. Smith for this error.

INTERNAL PARASITES OF DOGS AND CATS IN THE UNITED STATES AND TREATMENTS FOR REMOV-ING THESE PARASITES¹

By MAURICE C. HALL,

Senior Zoologist, United States Bureau of Animal Industry, Washington, D. C.

Dogs and cats are infested with numerous species of internal parasites, and worms of a given species may occur in large numbers in individual hosts, sometimes causing serious injury or even death as a result of massive infestation. Some species of parasites are more injurious than others, hence the importance of a knowledge of these parasites and the injuries due to them. Many of these parasites are more prevalent in young animals than in mature animals and are more injurious to young animals than to older ones, and in such cases the protection of young animals from infection is very important. In this paper especial attention is given to the commoner and more important parasites and to forms occurring in the United States, no attempt being made to discuss the numerous parasites which have been reported only from places outside of this country and its possessions.

FLUKES

Paragonimus westermani. This fluke, known as the lung fluke, is a thick worm 3 to 14 mm. long by 2 to 6 mm. wide by 3.5 to 5 mm. thick. It has been reported from the dog in Ohio and California and from the cat in Michigan, Wisconsin, Minnesota, Missouri and California. It occurs in swine in this country, especially in Louisiana, Arkansas and other Southern States. It occurs in man in China, Japan, Korea, Java and Peru.

The life history of this fluke involves the passage through 2 intermediate hosts, the first host being a snail of the genera *Melania* and *Ampullaria* and the second a fresh-water crab or a crayfish. In the second intermediate host the flukes encyst as larvae on the gills and in the muscles, hypodermis and liver. It is probable that the encysted forms on the gills break off and float about, thus making it possible for a suitable primary host to become infested by drinking water containing these larvae as well as by eating infested crustaceans. When swallowed by such a host,

¹Read at the fifty-ninth annual meeting of the American Veterinary Medical Association, St. Louis, Mo., August 30, 1922.

the young flukes pierce the walls of the digestive tract, enter the abdominal cavity and perforate the diaphragm either directly or after entering the liver. After entering the thoracic cavity, the flukes make their way into the lungs and develop to adults, forming cysts which communicate with the bronchioles or bronchi, thereby permitting the escape of the fluke eggs in the saliva.

The cysts in the lungs are surrounded by inflamed and indurated areas and the adjacent bronchi are congested and more or less inflamed. In man a common sympton is the coughing of blood, or parasitic hemoptysis.

As regards treatment for animals infested with these worms, it is reported in a brief review of a paper by Ando that he has had good results from the administration of tartar emetic, presumably intravenously, but we have been unable to obtain details in regard to this. Low is of the opinion that tartar emetic will prove of value against these flukes. Ando has reported some experiments with dogs which indicate that animals may develop some immunity to reinfestation with these flukes following a first infestation with them.



Fig. 1. Amphimerus pseudofelineus. Enlarged. From Barker, 1911.

Preventive measures would lie in the direction of preventing animals from eating crustaceans which might serve as intermediate hosts of the fluke. The intermediate hosts are not yet known for the United States, but the distribution of the parasites in this country and the occurrence of hosts similar to those in the Orient suggest that our crayfish and certain snails may prove to be the usual hosts. Measures for the destruction of crayfish are in order on other grounds, owing to the known economic damage due to them. A prophylactic measure to guard against encysted larval worms consists in the provision of a safe supply of drinking water.

Amphimerus pseudofelineus (Opisthorchis pseudofelineus). This is an American liver fluke of cats and is an oblanceolate fluke,

tapering anteriorly, (Fig. 1), and 5 to 22 mm. long by 1 to 3 mm. wide. It has been reported from the biliary canals of the cat in Nebraska and Iowa.

The life history of this worm is unknown, but judging from its relationships the miracidium on hatching enters a suitable snail and after a period of development becomes infective for fish. In the fish the flukes encyst in the muscles and when such infested fish are eaten by cats, the young flukes make their way to the ducts of the liver, apparently by traveling up the common gall duct, or sometimes enter the pancreatic duct.

Nothing is reported in regard to the lesions and other pathological conditions due to this flukes, but a related species, *Opisthorchis felineus*, may give rise to a thickening of the walls of the ducts of the liver and pancreas, with a related catarrhal condition, the infestation ultimately leading to a true parasitic cirrhosis of the invaded organs.



Fig. 2. Parametorchis complexus. Enlarged. From Stiles and Hassall, 1894.

No treatment appears to have been developed as yet for the destruction and removal of these flukes, but if they prove to be blood-suckers they might be destroyed by the use of male fern or kamala or derivatives of these drugs. These drugs do not appear to be effective against liver flukes which are not blood-suckers.

The obvious preventive measure is to prevent cats eating raw or insufficiently cooked fish.

A closely related worm, *Opisthorchis wardi*, has recently been described from the cat in the Philippines.

Parametorchis complexus. The complex liver fluke of cats is a worm 5 to 7 mm. long, sometimes extending to a length of 1 cm., by 1.5 to 2 mm. wide (Fig. 2). It has been reported from the cat in New York, Maryland and the District of Columbia.

The life history is unknown, but is probably similar to that outlined as the probable life history of A. pseudofelineus, involving intermediate stages in snails and in fish.

Little is known in regard to the pathological conditions caused

by this fluke, though Stiles and Hassall state that in 1 case the liver was of a peculiar dark color and the ducts contained "a greenish pus-like fluid." Treatment and prophylaxis would be along the lines indicated for A. pseudofelineus.

Cotylophallus venustus. This is an intestinal fluke collected from the dog, cat and fox at Washington, D. C. It is very small, attaining a length of only 1.3 mm. The life history is unknown, but judging from related forms it probably has an intermediate stage in fish. There is nothing known about treatments for removing this fluke, but male fern has been found effective against other intestinal flukes, and so has thymol. Prophylaxis is problematical, but preventing animals from eating insufficiently cooked fish is indicated.

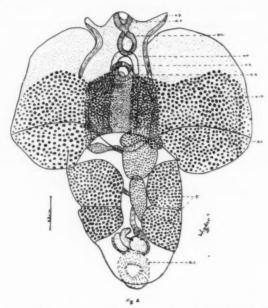


Fig. 3. Alaria americana. Enlarged. From Hall and Wigdor, 1918.

Cryptocotyle lingua. This fluke, normally a parasite of gulls, has been reported once from the dog at Detroit, Michigan, by Wigdor under the name of Hallum caninum. It is a small fluke, attaining a length of slightly over 2 mm. Its life history involves intermediate stages in such fish as the cunner, tautog, etc. As an accidental parasite of the dog it has some scientific interest but little economic interest.

Alaria americana. The American hemistome of dogs and cats is a worm 3 to 5 mm. long, with a flattened, more or less disk-

like anterior body and a cylindrical posterior body (Fig. 3). On each side of the oral sucker are 2 crescentic projections. This fluke has been collected from the dog in Detroit, Michigan, and more recently by Dikmans at Baton Rouge, Louisiana. Specimens from the cat at St. Paul, Minnesota, were sent in to the Bureau of Animal Industry at Washington, D. C., by Dr. Wm. A. Riley, and Dr. Karl Hanson has collected it from the fox at Keeseville, New York.

The life history of this worm is unknown and the life histories of the entire group to which it belongs have been largely a matter of speculation until recently. Recent developments indicate that much of the speculation was erroneous. It has been generally assumed that the holostomes developed without generations produced by asexual methods of reproduction, that is, without sporocyst development or the development of a number of cercariae in a redia, but recent investigations indicate that these worms develop much the same as do the members of the superfamily Fascioloidea. Larval forms develop and pass through intermediate hosts, including snails and fish or a number of other animal groups. The cercaria has a long, deeply cleft tail.

These flukes appear to have little pathological significance. Jeffreys has reported that these flukes can be removed by carbon tetrachloride, and studies on treatment for the removal of these flukes have been carried on by Dr. Karl Hanson of the Biological Survey. According to a paper by him which I have seen through the courtesy of the Biological Survey and of Dr. Hanson, he has

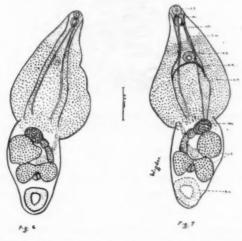


Fig. 4. Alaria michiganensis. Enlarged. From Hall and Wigdor, 1918.

found carbon tetrachlorid effective in removing these flukes. This is of interest as showing among other things that in their reactions to anthelmintics flukes are somewhat intermediate between tapeworms and roundworms. Such drugs as carbon tetrachlorid are ineffective against tapeworms, though carbon tetrachlorid is effective against flukes, as noted above. Thymol is most effective against roundworms and will remove some tapeworms, but appears to be more effective in removing certain flukes than in removing tapeworms. Male fern is effective against tapeworms, apparently effective against certain flukes, including the common liver fluke, but is of little value against roundworms, although it has been used to some extent for the removal of some of the roundworms, including hookworms.

Alaria michiganensis. The Michigan hemistome is a small fluke, 1.8 to 1.91 mm. long, somewhat similar to A. americana, but smaller and without the crescentic projections at the anterior end (Fig. 4). So far it has only been collected at Detroit, Michigan. The life history is unknown, but presumably is similar to that outlined as the probable life history of A. americana. The pathology and treatment are probably similar to those for A. americana.

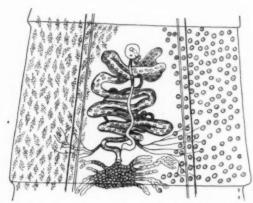


Fig. 5. Diphyllobothrium latum. Diagrammatic figure of segment. Enlarged.
From Railliet, 1893.

TAPEWORMS

Diphyllobothrium latum. The broad fish tapeworm (Fig. 5) attains a length of 2 to 9 meters, or longer, and a width of 2 cm., and is usually grayish-yellow to brown in color. The almond-shaped head has 2 slit-like suckers and the neck is thin. This worm has been collected once from the dog in the United States,

being reported from North Dakota by Van Es and Schalk. It has been reported in persons never out of the United States by Nickerson as early as 1906 and there now appear to be a total of 7 such cases, including the recent case reported from Ft. Wayne, Indiana, by Wallace and Grant and 2 cases reported from Chicago, Illinois, by Calvin. The worm occurs in the cat, but there are no American records of its occurrence in this host.

The complete life history of this tapeworm has only recently been ascertained. Janicki and Rosen found that when the tapeworm egg hatched in water, releasing its free-swimming larva, this larva, if swallowed by a copepod, Cyclops strenuus or Diaptomus gracilis, penetrated the intestine of the copepod and transformed in the body cavity to a procercoid, which is armed with hooks on a globular caudal appendix. The parasitized copepods become less active and move slowly on the river bottom. When these infested copepods are eaten by fish, the procercoids are set free and lose their hooks and the caudal appendix if these have not already been lost in the copepod. The resultant larva traverses the wall of the fish's stomach, enters the body cavity, and makes its way from there to the musculature or the liver, forming the plerocercoid. This is the first case in which a tapeworm has been found to have 2 intermediate hosts and 2 corresponding larval stages. When the plerocercoid in the fish is eaten by a suitable host, as a dog or a man, it develops to the adult worm in the intestine.

From the standpoint of pathology this worm is of especial interest from the fact that in man it causes the so-called Bothriocephalus anemia, a very grave form of anemia. It has been claimed that this anemia only occurs in those cases where the strobila, or part of the strobila, dies and degenerates, and that the anemia is associated with the absorption of this dead cestode material. A number of fatal cases of Bothriocephalus anemia have been reported, but no case of the sort is reported from the United States. In some cases severe gastric and nervous symptoms have been reported. The symptoms in the case of the dog appear to have received little attention, but the worm is probably a serious parasite in this case also.

This worm does not appear to be difficult to remove by means of such classic treatments as those with male fern or pelletierine tannate. While there are as yet no reports in regard to the efficacy of arecoline hydrobromide in removing this particular tapeworm, the reports in regard to the efficacy of this drug in removing the commoner tapeworms of the dog suggest that it would be equally as effective against this worm.

The oral administration of arecoline hydrobromide, long used by the veterinary profession as a purgative administered hypodermically, for the removal of tapeworms from dogs is a treatment for which we are indebted to Lentz. This treatment has not been critically tested by the writer, but the reports in regard to its efficacy indicate that it is a more satisfactory treatment than those with other drugs as used heretofore. The drug is given in doses of ¼ grain to dogs of average size and ½ grain to small dogs. These are small doses and easy to give. "Results are promptly obtained, the tapeworms passing out in the course of a half hour as a rule, a feature which appeals to the veterinarian's client. No purgative is necessary, as the drug itself is a purgative.

Prophylaxis here, as in the case of some of the flukes already noted, depends on preventing dogs and cats eating raw or insufficiently cooked fish. Here, as in many other cases, prophylaxis also requires, as a measure desirable on many counts, that sewage should not be emptied untreated into fish-inhabited streams.

A somewhat similar tapeworm, *D. cordatum*, has been reported from Greenland and Disco Island as a parasite of the dog, walrus, seal and man.

Diphyllobothrium americanum, the American fish tapeworm, is a small worm, 7.5 to 36 mm. long by less than 2 mm. wide (Fig. 6). It has been found once in the dog at Detroit, but as the specimens were sterile it is likely that they were in an unusual host. The life history of this worm is unknown but is probably similar to that of D. latum in a general way. As it is probably an accidental parasite and as no symptoms were observed in connection with it, treatment appears to be of no especial interest.

Diphyllobothrium mansoni. This worm is said to be very similar to D. latum, but with a rather wide head, not cordate but suggestive of the head of D. cordatum. It appears to have a rather wide distribution and has been reported once in its larval form from this country in Texas.

The egg of this worm hatches in water and releases the freeswimming larva which is swallowed by a small crustacean, Cyclops leuckartii, and develops in it to the procercoid. When such infested crustaceans are swallowed by the next host, which may be a frog, snake, chicken, duck, cat, pig, monkey, or man, the procercoid enters the abdominal cavity and makes its way

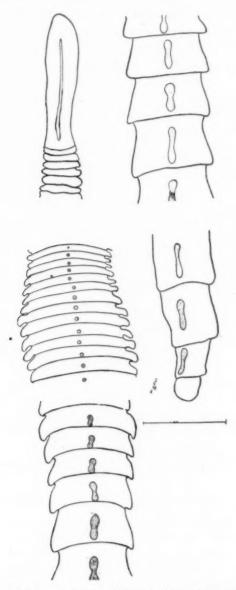


Fig. 6. Diphyllobothrium americanum. Enlarged. From Hall and Wigdor, 1918.

to various tissues, transforming to a plerocercoid. When such infested tissues are eaten by suitable carnivores, as the dog and cat, they develop to the adult worms in the intestine.

This worm appears capable of causing pathological conditions in the primary host. In a feeding experiment, Okumura reports that a dog in which 5 tapeworms developed became progressively weaker and died on the forty-fifth day. The larval worms, or plerocercoids, may cause serious injuries to the host animal. Yoshida reports that an infested cat died in an extremely emaciated and anemic condition. Suppuration may occur at the site of infestation. Their wandering habits as tissue invaders make these worms dangerous parasites and the occurrence of this worm in this country, even in an isolated case, warrants an effort to prevent its establishment and spread. Worms resembling D. latum in dogs should be given especial attention with reference to the possibility that they may be D. mansoni. The larval forms, referred to in the literature as Sparganum mansoni, are said to be especially prevalent in frogs in some parts of Japan.

The treatment for the removal of this worm is substantially the same as that for *D. latum*. Prophylaxis calls for thorough cooking of animal food to prevent infestation with the adult worms from ingestion of the plerocercoids, and the provision of a safe water supply to prevent infestation with the plerocercoids from the ingestion of infested crustaceans.

Mesocestoides lineatus. This worm has a head armed with 4 oval suckers, but without hooks, the worm attaining a length of 25 cm. to 2.5 meters. The genital pores open near the median



Fig. 7. Mesocestoides lineatus. Portion of strobila, showing mature segments. Enlarged. From Hall, 1919, after Neumann, 1896.

line of the segment on the ventral surface. (Fig. 7). The worm occurs in the dog and cat and some wild carnivores. The present writer has found a Mesocestoides, apparently this species, once in a dog imported from Europe by a soldier of the American Expeditionary Forces at the close of the late war. It was only found once in over 1000 imported dogs. However, the writer has also some specimens of a Mesocestoides collected from an American dog, though there has not yet been opportunity to make a specific determination of these worms.

The life history of these worms is as yet unknown. The worms probably cause about the same injury and symptoms that tapeworms in dogs and cats usually do, and the treatment is probably the same as that already given.

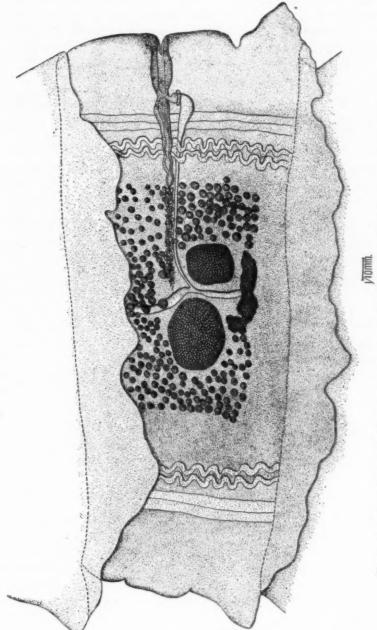


Fig. 8. Tacnia tacniaeformis. Mature segment. Enlarged. Sphincter vaginae shown at right., The vagina presents the appearance of terminating in the uterus. From Hall, 1919.

Taenia taeniaeformis (T. crassicollis). The thick-necked tapeworm of cats is easily identified by the head, which is cylindrical anteriorly and armed with very large hooks, 380 to 420 μ long, and by the absence of a neck, the segmentation beginning immediately behind the head. A peculiarity of the mature segment is the presence of a well-developed sphincter vaginae (Fig. 8). This worm is 15 to 60 cm. long.

The cysticercus of this tapeworm, Cyst. fasciolaris, commonly occurs in mice and rats, but is also reported from the vole, mole, lemming, beaver and bat. These animals become infested with cysticerci as a result of swallowing the tapeworm eggs in the feces of the cat, the cysticercus developing in the liver; cats become infested with the adult tapeworms as a result of swallowing the cysticerci in the livers of these intermediate hosts.

These worms appear to be distinctly pathogenic for cats. When present in numbers in a cat the animal loses its appetite, refuses food, and may show a transient diarrhea, followed by obstinate constipation. Salivation may be present. The abdomen is strongly retracted. If not relieved of its parasites by treatment, the animal becomes prostrate and may die in epileptiform convulsions. Chronic intestinal catarrh and gastritis have been reported. The intestinal mucosa is found inflamed on postmortem examination.

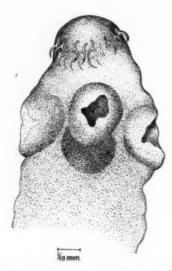


Fig. 9. Taenis balaniceps. Head, Enlarged. From Hall, 1919, after Hall, 1910.

Presumably arecoline hydrobromide would be as satisfactory a drug for the removal of this tapeworm from cats as it is for the removal of tapeworms from dogs, the dose being diminished to one suitable for cats.

Prophylactic measures in the case of this worm are somewhat complicated from the fact that whereas preventing cats from eating rats and mice is prophylactic, the catching of these rodents, which often involves the eating of them, is a leading function of many cats.

Taenia balaniceps. This tapeworm has been reported from Nevada and southern New Mexico, in one case from the dog, and in the other case from the lynx. It has a rather characteristic acorn-shaped head (Fig. 9). Nothing is known as to its life history, pathological effects or treatment.

Taenia pisiformis (T. serrata). This is one of the most common of the dog tapeworms, but is very rare in cats. It can be identified by its large hooks, which are 225 to 294 μ long. (Fig. 10).

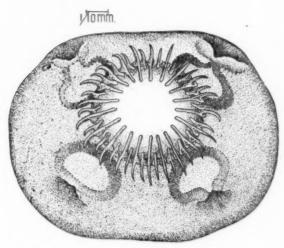


Fig. 10. Taenia pisiformis. Head, viewed from the front. Enlarged. From Hall, 1919.

The bladderworm of this tapeworm, Cyst. pisiformis, is a common parasite of hares and rabbits and has been reported from the mouse and the mountain beaver. It occurs in the liver or mesenteries or free in the abdominal cavity of these hosts. Dogs become infested with the adult tapeworm by eating infested viscera of rabbits, and rabbits become infested with the cystic stage by swallowing tapeworm eggs from the feces of dogs and other hosts.

Tapeworms in the dog may cause changes in appetite, disposition to vomit, general restlessness and cramps. Railliet has reported a case of perforation peritonitis in a dog, the animal dying and 3 specimens of this tapeworm being found in the abdominal cavity postmortem. The writer has seen marked areas of inflammation at the points of attachment of specimens of this tapeworm, though in many cases these are not present. Other gastro-intestinal lesions and certain nervous disturbances may be due to tapeworms.

The arecoline hydrobromide treatment is indicated in cases of infestation with this worm. Prophylaxis is a matter of preventing dogs eating the viscera of rabbits unless the viscera are first properly cooked.

Taenia hydatigena (T. marginata). The marginate tapeworm is the largest of the taenioid tapeworms of the dog, though smaller than Diphyllobothrium latum or D. mansoni. The mature

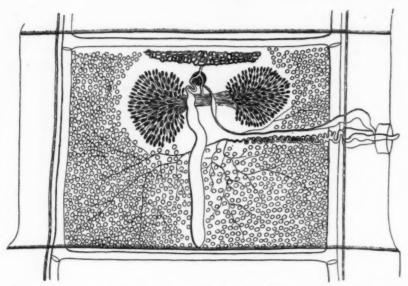


Fig. 11. Taenia hydatigena. Mature segment. Enlarged. From Hall, 1919 after Deffke, 1891.

segments are wider than long (Fig. 11). It was at one time very common in the United States, and doubtless is still very common in some localities, but in many places where it was once common it is now becoming scarce, owing to the fact that where food animals are slaughtered under proper supervision the inedible viscera containing the cysticerci, Cyst. tenuicollis, of this tapeworm are tanked and the parasites destroyed. Under the

insanitary conditions which were once more or less prevalent about slaughterhouses, dogs had access to these viscera and became infested with the tapeworms from eating the bladderworms in viscera, as these larvae occur in the liver, mesenteries and omenta of cattle, sheep and swine.

The pathological conditions are those due to tapeworms in general in dogs and the indicated treatment is with arecoline hydrobromide. Prophylaxis, as already noted, is largely the use of the "condemned" tank under the conditions of adequate meat inspection.

Taenia ovis. This tapeworm is best identified by the use of stained mounts, a distinctive feature being the position of the vagina, this structure either barely clearing the anterior margin

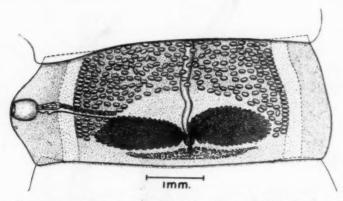


Fig. 12. Taenia ovis. Mature segment. Enlarged. From Hall, 1919, after Ransom, 1913.

of the nearest ovary or else crossing this ovary. (Fig. 12). This species has been reported in the cystic stage from Montana, Idaho, Washington, Oregon, California, Colorado and Nevada. It occurs as an adult worm in the dog, with its cysticercus in the voluntary muscles, heart, esophagus and lungs, and possibly in the kidneys and walls of the stomach, in sheep and goats. The life history is along the same lines as those of the foregoing species, involving the eating of infested portions of the carcass of the secondary host by the primary host, and the swallowing of eggs from the feces of the primary host by the secondary host. The pathology of infestations with this worm in the dog is substantially the same as for dog tapeworms in general. Treatment is the same as for other dog tapeworms. Prophylaxis involves preventing dogs eating raw mutton or goat meat, all such meat fed to them being first properly cooked, and the carcasses of

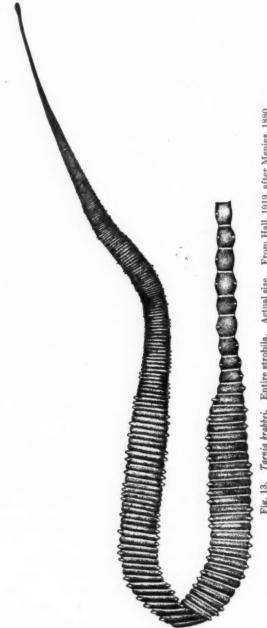


Fig. 13. Tarnia krabbei. Entire strobila. Actual size. From Hall, 1919, after Meniez, 1880.

dead sheep and goats on the range or pasture being burned or otherwise disposed of in such a manner that dogs cannot eat them.

Taenia krabbei. This worm is readily identified by the presence of a small head armed with hooks and 4 suckers, and of segments which are always much wider than long except in the case of the last 7 or 8 terminal gravid segments. (Fig. 13). This worm has been collected in Alaska and in Iceland. The cysticerci develop in reindeer. So far as dogs are concerned, the treatment and pathology of infestations with this worm are probably much the same as in the case of other dog tapeworms.

Multiceps multiceps. The gid tapeworm occurs in the dog and has been developed in the coyote. Gid is enzootic in Montana and sporadic cases of this disease in sheep, due to the bladderworm of this tapeworm, have been reported from Ohio, New York, Colorado and Arizona. The tapeworm is a rather delicate, translucent affair (Fig. 14), and its large hooks are comparatively

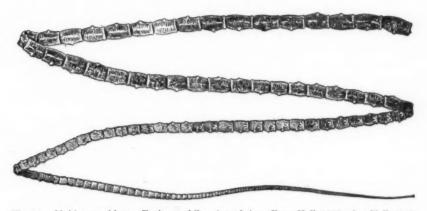


Fig. 14. Multiceps multiceps. Entire strobila. Actual size. From Hall, 1919, after Hall, 1910.

small, being only 150 to 170 μ long. The eggs of this tapeworm in the feces of dogs develop to a bladderworm with many heads, called a coenurus, usually in the brain, but sometimes in the spinal cord, of sheep, goats and cattle. Infested animals are said to have the gid, and they show distinctive nervous symptoms, usually circling and carrying the head to one side. Such animals die in almost all cases and dogs or coyotes may eat the brain containing the larval tapeworm. The writer has shown that dogs get the brain from a sheep skull by licking it out through the foramen magnum, usually after enlarging the foramen.

The heads on such a bladderworm develop to adult tapeworms in the dog.

The pathology of infestations with this tapeworm is similar to that of dog tapeworms in general, but owing to the presence of numerous heads on the bladderworm, dogs are more likely to be infested with a large number of worms, and Henry has reported one case in which a dog died of intestinal obstruction due to massive infestation with tapeworms of this species. The treatment is the same as that for other dog tapeworms.

Prophylaxis is largely a matter of destroying the skulls of sheep dying of gid in order to destroy the bladderworm and prevent the infestation of dogs and coyotes. In actual practice it is difficult to get sheepmen and farmers to do this and gid continues to kill sheep in Montana as it has done for over 30 years. A supplementary measure in this case, as in the case of other dog and cat tapeworms is the routine treatment of these animals to remove tapeworms. Where animals are exposed to tapeworm infestation of any sort, it may be advisable to treat for tapeworms 4 times a year. Sheep dogs especially should be kept free from tapeworms.

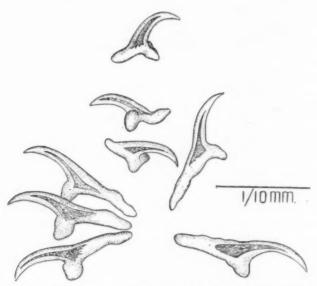


Fig. 15. Multiceps serialis. Large and small hooks. From Hall, 1919.

Multiceps serialis. This tapeworm is somewhat similar to the foregoing, but is a less delicate worm. The hooks (Fig. 15) are very variable in form; the small hooks are 78 to 120 μ long.

It is quite common in dogs in the United States. The larval stage, a coenurus, occurs in rabbits and squirrels in the connective tissue, intermuscular, subcutaneous, in the heart muscle, etc. The pathology is somewhat similar to that for *M. multiceps*, the worms tending to occur in massive infestation owing to the development of numerous heads from the coenurus. Henry and Ciuca state that sometimes infested dogs pass masses of these worms and the infestation terminates spontaneously. Treatment is the same as for previous species of tapeworms. Prophylaxis calls for preventing dogs eating infested rabbits.



Fig. 16. Echinococcus granulosus. Strobilate tapeworm. Enlarged. From Hall, 1919, after Leuckart, 1880.

Echinococcus granulosus (Taenia Echinococcus). The hydatid tapeworm, which is less than 1 cm. long (Fig. 16), occurs in the dog and cat and in certain wild carnivores. It has been reported from the dog at Washington, D. C., by Curtice in a natural infestation and Welsh has developed it by feeding the hydatid to a dog. Ransom has reported it from the dog in Alaska. Kaupp states that it was found post mortem in 50 per cent of 80 dogs examined. The hydatid, or larval stage, occurs in man, almost all the domestic animals, including the dog and cat, and in a large number of wild animals, and develops in practically every organ and tissue. Hydatids are not uncommon in some parts of the United States, and while we have few records of the adult worm in dogs this is primarily due to the fact that they are not looked for to any great extent.

While the adult tapeworms of this species may be removed by anthelmintic treatment, it is inadvisable to treat such animals. Hydatids are a serious menace to human beings as well as to live stock, and dogs infested with this parasite should be killed and burned or disposed of in such a way that the carcass cannot serve as a focus of infection for hydatid disease as a result of the tapeworm eggs contained in it.

Prophylaxis in the case of this worm is best accomplished by the extension of proper meat inspection with its use of the "condemned" tank to interrupt the life cycle of such parasites as this one. Control of dogs, especially the wandering dog that finds its meals in the offal from the country slaughter house, is another measure of value.

Dipylidium caninum. The double-pored tapeworm of dogs and cats is very common in this country. It can be readily recognized from most dog and cat tapeworms by the double genital pores in each segment, but must be differentiated from another Dipylidium, D. sexcoronatum, by the fact that the latter species has 6 rows of hooks on the head and D. caninum has only 3 or 4 (Fig. 17). Both species occur in the dog and cat, D.

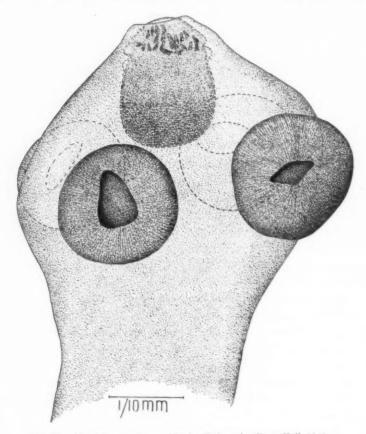


Fig. 17. Dipylidium caninum. Head. Enlarged. From Hall, 1919.

sexcoronatum having been reported from the cat by Chapin. This latter species has now been reported from Maryland, Massachusetts and Michigan.

The life history of *D. caninum* involves intermediate stages in fleas or biting lice. Biting lice become infested while feeding on the dog's skin with its contamination of feeal matter containing

tapeworm eggs. Fleas do not become infested as adult insects, but are infested as larvae. In both insects the larval tapeworms develop in the body cavity, the larva being known as a cryptocystis. In the flea the development to a cryptocystis does not take place until the larval flea changes to an adult. When infested fleas or lice are swallowed by dogs, the larval tapeworms develop to adults.

These worms differ from most dog and cat tapeworms in that the head is driven into the mucosa and works through it, drawing the strobila after it "like a train of cars," as Schiefferdecker puts it. This impairs the integrity of the mucosa and makes the removal of the worms difficult. The worms may cause a chronic diffuse catarrh, with an enlargement of the villi, which may become 4 to 5 times normal size. The escape of the segments of the worm from the anus often occasions pruritis, causing dogs to pull themselves along in a sitting posture to alleviate the itching, and this is especially true when a chain of segments is passing out.

Treatment is the same as for other dog and cat tapeworms, but the removal of the worm is sometimes difficult, owing to the fact that the head is buried in the mucosa and may not be removed by the anthelmintic.

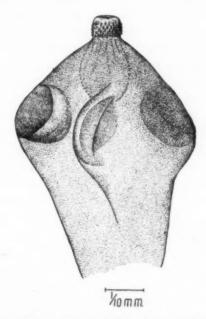


Fig. 18. Dipylidium sexcoronatum. Head. Enlarged. From Hall, 1919.

Prophylaxis is largely a matter of control of lice and fleas on dogs and cats.

Dipylidium sexcoronatum. The morphology of this worm (Fig. 18) has been briefly noted in connection with the discussion of D. caninum. The pathology and treatment are apparently much the same as for the last mentioned species. The life history is unknown.

ROUNDWORMS

Strongyloides stercoralis. The Strongyloides of man occurs in this host (man) in the United States. Fülleborn states that this species is readily transmissible to dogs and has found in the dog in China and Japan a species which appears to be identical with this. As these are small worms and easily overlooked, the parasitic female being only 2.4 to 2.64 mm. long, it is quite possible that they occur in dogs in the United States in spite of the fact that they do not appear to have been reported from this host.

There are no parasitic males, the parasitic females being parthenogenetic. These females deposit eggs in the epithelial cells lining the intestinal walls and covering the villi. After hatching, the rhabditiform larvae escape to the lumen of the intestine and pass out in the feces. Under favorable conditions these larvae may develop to filariform larvae capable of infecting a new host either by way of the mouth or of the skin, or may develop to free-living males and females. In the latter case the eggs produced by the females may develop to rhabditiform larvae and these to infective filariform larvae which may infect a new host by way of the mouth or the skin. The infective larvae enter the blood stream and make their way to the lungs where they enter the air passages, ascend the trachea, and are swallowed, developing to adult females in the lumen of the intestine.

Owing to the fact that the female worm burrows into the mucosa, these worms may give rise to certain tissue reactions, as evidenced by the cell proliferation in the affected regions. An associated anemia may also be due to these worms. The invasion of the mucosa may open portals of entry for pathogenic bacteria. Apparently the worm is not responsible for the diarrhea formerly attributed to it.

The removal of these worms from man has been found very difficult and apparently repeated treatments are necessary, as

the worms which are in the mucosa depositing eggs are apparently not accessible to treatment. Willis has reported good results from oil of chenopodium and Stiles reports that flowers of sulphur is sometimes effective.

Prophylaxis is largely a matter of sanitation with reference to the proper disposal of feces carrying infective material. Cutaneous infection must be guarded against.

Oslerus osleri (Filaria osleri). These worms occur in the trachea and bronchi, and apparently in the pulmonary parenchyma also. They were first collected and described from Canada by Osler and have been found in this country by Milks at Ithaca, New York. The male is 5 mm. long and the female 9 to 15 mm. long. The vulva is very close to the anus (Fig. 19).



Fig. 19. Oslerus osleri. Female tail. From Rabe, 1883.

The eggs produced by the female hatch in the uterus, giving rise to larvae which evidently make their way up the trachea are are either coughed out or swallowed and passed in the feces. They have been kept alive for a week in physiologic saline solution. Nothing more is known as yet in regard to the life history, but we may surmise from the relationships of this worm that it requires some intermediate host, possibly an arthropod, for its development.

These worms enter the lining of the trachea and bronchi, setting up a circumscribed trachitis or bronchitis which terminates in the formation of greyish-red nodules, variable in size and shape and attaining a diameter at times of 5 to 10 mm. They are most prevalent and largest at or near the bifurcation of the trachea. The infestation may give rise to a hard, dry cough, most noticeable after exercise or exposure to cold air. In heavy infestations there may be difficulty in breathing. The disease apparently runs a chronic course, but symptoms may come on suddenly and be followed soon after by death from asphyxia.

Treatment is unknown. Expectorants, cough remedies, inhalations of creosote and guaiacol, and intratracheal injections of 1 percent phenol in equal parts of alcohol and water have proven ineffective, as might be expected from the fact that the worms are protected by the nodules in which they lie.

Exact measures of control are unknown owing to our lack of knowledge of the life history, but sanitary measures in disposing of feces are indicated as of some value.

Dirofilaria immitis (Filaria immitis). This parasite was first described by Leidy from the dog in the United States and appears to be not uncommon in the South. It has recently been reported from the cat by Riley in a note presented at the Helminthological Society of Washington, this being the first record of this parasite from the cat. These worms are very long, the male 12 to 18 cm. long and the female 25 to 30 cm. long. As adults they occur in the circulatory system, especially in the right side of the heart and in the pulmonary artery, and have also been reported from the thoracic cavity, bronchi, esophagus, stomach and liver and free or in cysts in the subcutaneous and intermuscular connective tissue. The larvae occur in the blood and are occasionally found in cutaneous lesions.

The larvae disappear from the peripheral blood in the daytime, but are present there at night, a habit associated with the night-feeding habits of the mosquitoes which act as their intermediate hosts. When mosquitos take in these larvae in sucking blood, the larvae usually invade the Malphigian tubules of the insects and develop there, later escaping to the body cavity and making their way to the mouth parts of the host. It is probable that these larvae escape from the mouth parts as do the larvae of the human filaria, Filaria bancrofti, by breaking through the tip or sides of the labium, and then enter the wounded skin.

Infested dogs may show no symptoms of disease, though such animals may die suddenly. Death may follow from asphyxia, embolism or hematemesis. Occasional animals show convulsions or rabiform symptoms. Lung troubles, edema, ascites, epistaxis, photophobia and fixity of vision have been reported as symptoms. The larvae may cause parasitic fibrous nephritis or pseudotuberculous foci. As many as 150 adult worms may be present, such massive infestations giving rise to hypertrophy of the right ventricle, endocarditis, endarteritis, thrombosis, pulmonary congestion and related conditions. Diagnosis should be made on a careful examination of the blood.

No treatment has yet been found effective in destroying these worms. A measure which has been reported as effective in the control of these worms in the Fiji Islands consist in the use of mosquito-proof kennels with self-closing doors.

Spirocerca sanguinolenta. This parasite of the dog and of certain wild carnivores has been found in the United States in New York, Alabama, Georgia and the District of Columbia, specimens from Georgia and the District of Columbia being in the collection of the Bureau of Animal Industry. In the same collection are specimens from Lynx canadensis, the lynx being from the National Zoological Park at Washington. The worms are red when freshly collected, the males being 3 to 5 cm. long and the females 6 to 8 cm. long. They occur in tumors in the esophagus and stomach usually, but also in tumors in the aorta, the lymph glands, respiratory tract, liver and intestine.

The eggs, which contain an embryo when deposited, pass out in the feces of the primary host and are swallowed by coprophagus beetles. The eggs hatch and the larvae bore through the intestinal walls and encyst in the body cavity of the insect, developing there to the infective stage. When such infested beetles are swallowed by a suitable primary host the larvae make their way to certain tissues and organs and there develop to adults.

The tumors caused by these worms give rise to very variable lesions and symptoms, due to their varying locations. In the digestive tract they may cause stenosis or perforation of the esophagus, vomiting, loss of appetite, emaciation, dysphagia, eructations, nausea, and sometimes peritonitis. In the circulatory system they may cause angina, dyspnoea, suffocation syncope and internal hemorrhage. In the respiratory tract they cause cough, accompanied by nausea and vomiting, and a short noisy aspiration. At times nervous symptoms are well marked. The prognosis is grave, the infestation usually terminating in the death of the animal.

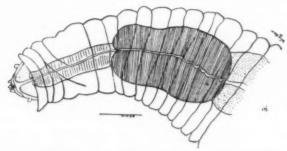


Fig. 20. Physaloptera rara. Anterior extremity of female. Enlarged. From Hall and Wigdor, 1918.

There is no known treatment for the destruction and removal of these worms. Prophylaxis depends on preventing dogs from eating the beetles which are the secondary hosts. While one might suppose that dogs do not eat beetles, the infestations with these worms show that they do so in some places to a considerable extent. The supervision of a dog's food and his habits in general, and the use of a suitable muzzle, if necessary, would apparently be prophylactic.

Physaloptera rara. This worm (Fig. 20) has been found only once, being reported from the duodenum of a dog at Detroit, Michigan. This is probably a case of accidental parasitism, the worm being presumably a parasite usually occurring in some other host, possibly a wild carnivore.

Dioctophyme renale. The giant kidney worm of the dog is a large, cylindrical, blood red worm, attaining a length of 102 cm. and a width of 1.2 cm. It is usually in the kidney or free in the abdominal cavity, but has also been reported from the liver and thoracic cavity and has been found encysted in the abdominal cavity. The records available to me at the present time show that this worm has been found in dogs in the United States up to the present time in about 70 cases. This parasite is also reported from the horse, cattle, swine, some wild carnivores and man.

The life history is not yet known. When the female worm is in the kidney the eggs pass out in the urine, but when she is in the body cavity the eggs are largely picked up by the omentum and apparently are not in a position to carry on the life cycle. The eggs develop slowly and require moisture for their development. The embryo forms in 5 or 6 months in winter and may survive for 5 years under favorable conditions. recently found in the muscles of a fish, Idus idus, a nematode larva which he believes in the larva of D. renale. A dog fed 14 specimens of this fish developed a female D. renale 63 cm. long in the course of 4 to 5 months. The larva was 1.715 mm. long. Jägerskiöld believes that a nematode larva found in a fish by Schneider is a larva of Eustrongylides, a genus related to Dioctophyme, and Travassos has recently reported a similar observation. It therefore appears that fish act as intermediate hosts of the giant kidney worm. Balbiani was unable to get the eggs to open in the intestines of various fish. This may have been due to unfavorable circumstances of some sort or it may be that

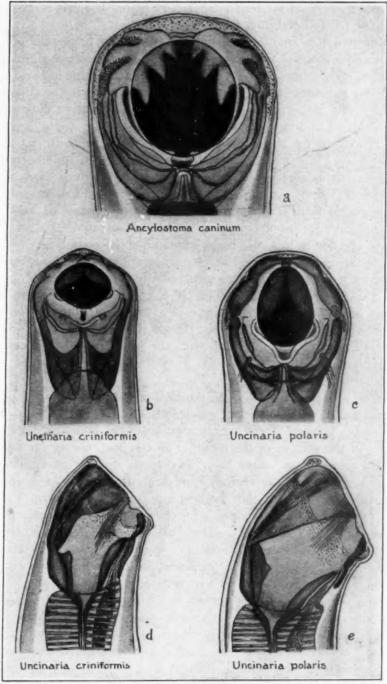


Fig 21. Hookworms. Heads in dorsal and lateral views. Enlarged. From Riley and Fitch, 1921, after Looss, 1911. Uncinaria polaris is U. stenocephala. U. criniformis is not yet known from dogs or cats.

another intermediate host is necessary before the fish, as in the case of Diphyllobothrium latum.

Infested dogs are said to be dull as a rule and to have a wabbling gait and a hoarse bark. Nervous symptoms sometimes simulate rabies. Sometimes the pain leads to constant whining or barking, the dog throwing itself about. Where the worm is in the abdominal cavity no symptoms may be noticed. Positive diagnosis depends on finding the eggs in the urine.

Treatment for the removal of this worm is surgical, but the presence of the worm is usually not ascertained antemortem. Luckhardt has reported the removal of this worm from the abdominal cavity in 2 cases, with recovery noted in 1 case, but the worms were only found incidentally in connection with a laparotomy for other purposes. Brumley has reported a similar case, the dog in this case being killed after the operation.

So far as can be judged at present, prophylaxis is a matter of

preventing dogs from eating insufficiently cooked fish.

Ancylostoma caninum. This is the common hookworm of dogs in the United States, being especially prevalent in the South, and is also a parasite of the cat, though it seems to have received little attention in connection with the latter host. It is easily identified by the 6 prominent curved teeth near the ventral border of the mouth capsule (Fig. 21).

The eggs produced by the female hookworm pass out in the feces and develop embryos which hatch and develop in turn to infective larvae. These larvae are capable of infecting dogs by way of the skin or of the mouth. In the host, the larvae enter the blood stream, make their way to the lungs, enter the air passages, ascend the trachea, and are swallowed. After some further development they become adult worms in the intestine.

These worms are responsible for the condition known as kennel anemia. The symptoms are those usually associated with blood-sucking worms—anemia, edema, weakness, and emaciation. There may be digestive disturbances with diarrhea or constipation, sometimes with blood macroscopically visible in the feces. Some of the symptoms appear to be associated with a toxin production by the worms. Among other things, dogs suffering from hookworms may have a sunken eye, foul breath, unthrifty coat, erythema inside the thighs and elbows, albuminuria, epistaxis and pronounced dullness and depression. Operative wounds or accidental injuries heal slowly on such animals and there is a tendency to ulcer formation. On postmortem exam-

ination the characteristic finding is the presence of petechiae in the small intestine marking the points of attachment of the worms. Diagnosis may be made on the clinical findings but should be confirmed by microscopic examination of the feces and the finding of the elliptical, thin-shelled eggs.

The treatment of dogs for hookworm disease has been a difficult matter. Thymol was not very effective and although oil of chenopodium, especially if followed by chloroform, would remove a high percentage of the worms present it was also toxic in too many cases in the dose necessary to remove hookworms. In 1921 the carbon tetrachlorid treatment for the removal of hookworms from dogs was developed in the Bureau of Animal Industry and this treatment has come into general use since that time. The chemically pure drug is administered in capsules at a dose rate of 0.3 cc per kilo of weight, making a dose of 3 cc for a dog of average size (22 pounds). The dog should be fasted overnight and not fed for 2 or 3 hours after treatment. purgative appears to be necessary with carbon tetrachlorid as the drug acts in therapeutic doses as a mild purgative, but the administration of salts after carbon tetrachloride has been found in human medicine to diminish unpleasant symptoms and increase the safety of the drug. Hemorrhagic enteritis, hepatic cirrhosis and renal lesions appear to be contra-indications for the use of this drug.

Care must be taken that the capsules do not break in the mouth and allow the drug to enter the lungs. If this happens the animal will collapse and may die. Some of these cases are revived by artificial respiration, holding the animal head down to allow the escape of the heavy vapors of the drug from the lungs. Properly given the drug has a large margin of safety, and Hall and Shillinger report the administration to a 20-kilo dog of 320 cc of the drug, a dose at the rate of 16 cc per kilo, or 53 times the therapeutic dose rate. This is an unusually large safety factor for a drug. In the presence of the contra-indicative conditions noted above, the safety factor is greatly reduced.

Prophylaxis for hookworm disease is essentially a matter of cleanliness. Frequent and thorough removal of feces from yards and kennels is important. Dirt surfaces should be scraped off and renewed from time to time and wooden and concrete structures cleaned with boiling water, lye and soap, or hot, strong, coal-tar solutions, depending largely on the vigorous and thorough use of a good brush for results. Pups especially require clean

quarters for the first few months of their lives as this is the danger period in which they are most susceptible to the worms and to the damage caused by them.

Ancylostoma duodenale. This is the Old World hookworm of man and occurs in man in the United States, though less commonly than does Necator americanus, the American hookworm of man. Looss has been able to infect young dogs with these worms and so have Calmette and Breton and also Alessandrini, the last named developing 1 male and 2 females to sexual maturity. Miyagawa has reported this worm from the dog at Tokyo. It is given passing mention here as a matter of interest.

Uncinaria stenocephala. The mouth parts of this hookworm have cutting plates but no curved teeth. (Fig. 21). The only records of this worm from the dog in the United States are one by Muldoon at Ithaca, New York, and one by McNair at Berkeley, California, the latter finding the worm in a Chow dog imported from China. This worm is, however, the common parasite of foxes in this country. Ransom has pointed out that it appears to have a more northern range than A. caninum. The life history and prophylaxis are substantially the same as those for A. caninum. The treatment is also the same, the work of Allen, Hanson and others having shown that carbon tetrachloride is about as effective in removing these worms from foxes as it is for removing A. caninum from dogs, and that it is much safer for foxes than the drugs previously used for removing hookworms from these animals.

Necator americanus. This is the American hookworm of man. Stiles has reported the collection of what is apparently this species from the dog in the Southern United States on two occasions, and Stiles and Goldberger have developed this worm to the fourth-stage larva in the dog by cutaneous infestation. It is mentioned here as of interest rather than as of importance to veterinarians.

Ollulanus tricuspis. This worm occurs as an adult in the stomach and the gastric mucosa of the cat and has been reported once from this host in the United States at Washington, D. C. The larvae have been reported from the gastric mucosa, pleura, diaphragm, liver and lungs of the cat and from the muscles, heart, esophagus and the connective tissues of the cervical region of mice. This is a very small worm, the male being only 0.56 mm. long and the female about 1 mm. long.

The life history is incompletely known. The eggs hatch in

the uterus and some of the larvae pass out in the feces while others migrate into the host tissues in a manner similar to that of trichinae. The latter form cysts and seem to degenerate rather rapidly, which would suggest that this was not a normal part of the life cycle. Larvae fed to mice entered the tissues and encysted, but these encysted forms did not develop to adults when infested mice were eaten by cats.

The worms in the tissues give rise to inflammation and in heavy infestations this may result in the death of the animal. The bronchial mucus is bloody and contains motile larvae. The adult worm may cause severe inflammation and ecchymoses or a chronic catarrhal gastritis. Galli-Valerio reports a case in which the stomach showed only a slight hyperemia.

No treatment is known. Prophylaxis is uncertain, though the possibility remains that mice may be intermediate hosts and that if cats are not allowed to eat these and other rodents they may be safe from infestation with these worms.

Trichuris vulpis (Trichuris depressiuscula). The whipworm of the dog and fox is quite common in this country, being found in practically 40 percent of 300 dogs examined at Detroit by Hall and Wigdor, with an average infestation of over 21 worms. The worms have a slender anterior portion which is about 3 times as long as the thick posterior portion. (Fig. 22). They are from 4.5 to 7.5 cm. long.



Fig. 22. Trichuris vulpis. Female. Enlarged. From Fiebiger, 1912.

The embryos develop in the eggs and require a rather long time for development, about 5 months in Railliet's experience. When embryonated eggs are swallowed by a suitable host, the young worms apparently develop in the cecum and do not enter the circulation. They mature in the course of three months.

These worms not infrequently give rise to a low grade inflammation at the point of attachment, usually at the tip of the cecum. The anterior end of the worms is sewed in the mucosa, thereby impairing its integrity. In man, a related species appears to cause symptoms of distress and the same may be true of dogs.

It is difficult to remove these worms by anthelminitic medication, owing to the fact that drugs passing the ileo-colic valve of the dog may not enter the cecum. To ensure entry it would appear necessary to use such treatments as the use of repeated doses of some drug which is not a gastro-intestinal irritant, such as santonin, giving it daily for a week, suspending treatment for a week, and then repeating for a week, this treatment to be continued until the feces are negative for whipworm eggs. These lemon-shaped eggs are easily distinguished from the eggs of most worms commonly present in dogs in this country. Another method of ensuring the entry of a drug into the cecum is to use a bulky anthelmintic of low toxicity. The latex of a South and Central American fig, Ficus laurifolia, given in large doses, is used for the removal of these worms from man in South America, the latex being known as leche de higueron. Unfortunately this substance does not keep well and as yet it does not seem adapted to export for use outside of countries where the tree grows. Another method of attack would be to use rectal injections after the manner of gastro-intestinal lavage in the dog, using some anthelmintic solution. Hall and Wigdor found that gastrointestinal lavage with water or water and soap alone removed all the whipworms from 2 dogs and left all the whipworms in 2 other dogs. The addition of an anthelmintic substance might make this lavage treatment effective for whipworms. Dr. Campbell writes me that Dr. Quitman has used a turpentine-soap or turpentine-acacia emulsion for lavage. Another solution of the matter is that proposed by Miller, namely, the surgical removal of the cecum. For most dogs the cost of such an operation would not warrant this procedure and it seems that with light infestations the injury from the worms would be less than from the operation. Moreover, where dogs are heavily infested, the worms, which in light infestations are clustered about the tip of the cecum, are distributed throughout the cecum and along the upper colon, and the surgical removal of the cecum would not remove the worms from the colon or make the dog, in all probability, immune to further infestation.

Prophylaxis is essentially a matter of sanitation and cleanliness. Capillaria lineare. This worm, one of the relatives of the whipworm, was described by Leidy from the intestine of the cat in this country, probably at Philadelphia, and does not appear to have been found since. The male is 3.75 cm. long and the female 5 cm. long. For practical purposes we may assume that

the life history and prophylaxis are probably very similar to those for the whipworm. Nothing is known in regard to treatment, but the worm is not known to be of any such importance as to make this a matter of practical interest.

Capillaria aerophila. The lung hairworm of carnivores has been reported by Chandler as present in 7 of 27 cats examined in the United States, apparently in Michigan. It is also a common parasite of foxes in the United States and Canada and as it occurs in the dog elsewhere it seems reasonable to suppose that it occurs in this host in this country. The worms are very slender, the male being 2.4 cm. long and the female 2.5 to 3.2 cm. long.

At the present time the life history of this worm is unknown. The adult worms live in the air passages of the lungs and the eggs are coughed up and swallowed, passing out in the feces for the most part. Under favorable conditions an embryo develops in the egg and animals are doubtless infected by swallowing such embryonated eggs. How the young worms make their way to the lungs is not known, but it may be assumed that they enter the blood vessels in the walls of the digestive tract and leave the blood vessels for the air passages of the lungs.

These worms may cause catarrhal changes in the lungs and in heavy infestations the bronchi may be occluded by masses of worms. The eggs of what appear to be these worms have been found in the nasal discharges. Chandler reports that infested foxes wheeze, especially after running, and may have a choking cough and running at the nose.

Good food and nursing treatment is probably the best method of handling an infested animal. Prophylaxis consists in sanitary measures, and especially cleanliness.

Trichinella spiralis. Trichinae occur in a large number of hosts, including the dog and cat. Hall and Wigdor report the experimental production of these worms in the dog at Detroit, but we do not recall any record of the natural occurrence of the worms in the dog or cat in the United States. It is possible that these worms are not as uncommon as our lack of records would indicate, the lack of records in the case of these animals being for the most part due in this country to the lack of examinations for parasites and a failure to publish the findings when examinations are made. In Denmark, Höyberg in 1906 found 6 cases of trichinae in 500 dogs (1.2 percent) and 5 cases in 100 cats (5 percent). Fiebiger states that in Saxony trichinae have

been found in 0.5 to 1.4 percent of dogs, and only in 0.023 percent of the swine, which distinctly reverses the relations of these animals to trichinae as we commonly conceive of these relations. It would be of interest to see what a microscopic examination of a series of dogs for trichinae in this country would show. We know that rats harbor trichinae and that some dogs and many cats catch and eat these rodents. In this connection it should be remembered that the larvae of *Belascaris marginata* may occur encapsulated (Fig. 24) in the liver, kidneys, muscles, brain, etc., of dogs, as Füelleborn has shown, and that these larvae may be mistaken for trichinae.

The life history of trichinae needs only a bare outline. If meat infested with larval trichinae is eaten by a suitable host, the larvae develop to adults in the intestine of this host and the female worm deposits live embryos in the lymph spaces of the intestinal wall. These embryos are carried throughout the body by the blood after reaching the blood vessels, and develop to encysted larvae in the voluntary musculature.

Although trichinae are markedly pathogenic for man, they appear to cause but few symptoms and little distress in the case of dogs and cats.

Toxascaris limbata. Ascarids belonging to this species or to a related species, Belascaris marginata, are very common in the United States, being found by Hall and Wigdor at Detroit in over 53 percent of 300 dogs. Apparently one of these species may predominate in some places and some years and the other species in other places and other years. T. limbata can be differentiated from B. marginata by the fact that in the former the vulva of the female is at the union of the anterior and middle thirds of the body, and the genital tubes, which can be seen through the body wall, do not extend anterior to the vulva, whereas in B. marginata the vulva is near the union of the anterior fourth of the body with the posterior three-fourths, and the genital tubes extend anterior to the vulva, usually into the anterior ninth of the body. They may also be differentiated by the presence of a posterior bulbous portion in the esophagus of B. marginata, which is lacking in T. limbata. (Fig. 23).

The eggs of these worms pass in the feces and embryos form in them under favorable conditions in the course of 2 or 3 days. When such eggs are swallowed the young worms hatch and make their way to the lungs, where they enter the air passages and are swallowed, developing to adult worms in the intestine. Ac-

cording to Fülleborn, there are apparently certain differences in the life history of this species and of *B. marginata*. He failed to produce intrauterine infection with Toxascaris under conditions similar to those under which intrauterine infection occurred in the case of Belascaris; he finds Toxascaris less common in pups than in Belascaris and more likely to be present in older dogs; and he finds Toxascaris less disposed to encyst in the host tissues in its larval stage.

In a general way, ascarids of all sorts are especially injurious to young animals. They appear to act as irritants to the sensitive mucosa of the delicate digestive tract of the young animal, causing derangements of appetite and digestion. In young animals they may be present in enormous numbers, Hall and Wigdor having reported 2000 from one pup in a case of natural infestation. In such large numbers they often cause occlusion of the intestine, and when present in large numbers they are apparently most disposed to wander to unusual situations, such as to the stomach, bile ducts, pancreatic duct, esophagus, nares, eustachian tubes, trachea and other tubes and cavities. In these situations they give rise to grave accidents at times, the nature of the injury depending on the site of infestation. Death is not an uncommon sequel in the case of pups and young dogs. We have too little information as yet to furnish exact information in regard to the damage caused by the passage of these worms through the lungs, but the effects observed in pigs indicate that such damage probably takes place in dogs in some cases of heavy infestation.

The most effective drug for the removal of ascarids from dogs is oil of chenopodium. For the purpose of removing these worms it may be given in doses at a rate of 0.1 cc per kilo (2.2 pounds) of weight, or 1 cc for a dog of average size (22 pounds). To protect the dog from the constipating and toxic effects of this drug, the animal should be given at least an ounce of castor oil immediately preceding or following a dose of 1 cc or less of chenopodium, and a larger amount of castor oil should be given with larger doses of chenopodium. While chenopodium is a fairly satisfactory drug, having an unusually high degree of efficacy in removing ascarids from dogs, it has not a large margin of safety, the lethal dose being at the rate of 0.5 cc per kilo, or 5 times the therapeutic dose. Because of this some veterinarians prefer santonin and calomel. If santonin is used, it should be given in repeated small doses for several days,

rather than in one large dose, as experiments and experience show that it is distinctly more effective if given in repeated doses. Some veterinarians prefer to use carbon tetrachlorid for removing ascarids from dogs. This drug is slightly less effective than chenopodium in removing ascarids, but if given in the dose advocated for removing hookworms it will remove all or almost all of the ascarids present in the great majority of cases and is much safer than chenopodium. The safety factor found by Hall and Shillinger for this drug, as previously noted, may be as high as 53, or over 10 times the safety factor of 5 for the therapeutic dose of chenopodium as compared with the lethal dose.

Prophylaxis for ascarids in dogs is a matter of sanitation and cleanliness, with especial precautions to protect pups for the first few months of life. According to Pagels, the greatest number of ascarids occurs in dogs 41 to 50 days old; from the fifty-first to the seventieth day many ascarids pass in the feces, and at the age of 71 to 90 days pups have on an average 15 to 17 ascarids. Sanitary measures have been found extremely effective in controlling roundworms of swine, and such a sanitary system, developed in the Bureau of Animal Industry and known as the McLean County System, has received extensive test in McLean County, Illinois, where it has effected great savings in the pig crop. Some modification of this system might be applied with great benefit to the raising of dogs.

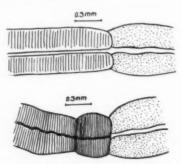


Fig. 23. Belascaris marginata (left) and Toxascaris limbata (right.) Union of esophagus and intestine, showing bulbous enlargement in B. marginata. Enlarged. From Wigdor, 1918.

Belascaris marginata. The morphology and life history of this worm (Fig. 23) have been indicated in the discussion of *T. limbata*. Füelleborn has produced intrauterine infestation of pups with *B. marginata*, and finds that the larvae have a tendency to form worm knots of encapsuled larvae (Fig. 24) in the liver, kidneys, muscles, etc. Apparently larvae which fail to

enter the air passages of the lungs and are carried back to the left side of the heart may behave as do trichinae larvae, leaving the capillaries of the systemic circulation and encysting in the tissues. For the most part the pathology, treatment, etc. are similar to these things for *T. limbata*.

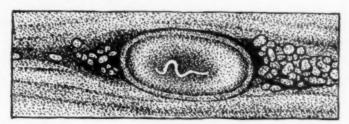


Fig. 24. Belascaris marginata. Encysted larva in diaphragm of dog. x 40.
From Fuelleborn, 1921.

Belascaris vulpis. This species, a parasite of foxes, was reported from the dog by Rudolphi at a time when ascarid species were not well differentiated and has since been reported from this host by Walton. Both records are open to suspicion of error on the evidence or lack of evidence, but presumably this parasite would develop in dogs. Jeffreys has reported this species from foxes in the United States, but did not publish a description or evidence on which to judge this report. This species is very similar to B. marginata, but the posterior extremity of the male body has a trough-like depression and is almost triangular in cross-section. Little of a definite sort is known about the habits of this worm, but we may assume that in general it behaves as does B. marginata.

Belascaris cati (Belascaris mystax). This is the cat ascarid, a worm shorter than B. marginata, which attains a length of 18 to 21 cm., and more slender than T. limbata, which rarely exceeds 10 cm., the length of B. cati, in length. The cephalic alae of B. cati are straight in front and rounded posteriorly and are quite conspicuous.

In general these worms behave as do the dog ascarids already discussed. They are more common in kittens than in older animals, but Lentz has found them in cats 10 and 12 years old. They may be removed by the use of chenopodium, santonin or carbon tetrachlorid, but all of these drugs are more toxic for cats than for dogs, chenopodium being twice as toxic for cats.

Oxyuris compar. This worm was reported as a parasite from the small intestine of the cat in this country by Leidy. A consideration of his description has led the writer to the conclusion that Leidy was dealing with Oxyuris ambigua, a common parasite of the large intestine of the rabbit in this country. If this view is correct, Leidy's name should be dropped into the synonomy of O. ambigua and the record regarded as a case of pseudoparasitism due to the finding of a rabbit parasite in the small intestine of a cat that had a short time previously eaten the intestines of an infested rabbit.

THORNY-HEADED WORMS

Oncicola canis. The American thorny-headed worm of the dog occurs in Texas, and Ward has reported one case from Nebraska. These are small worms, the female 1.4 cm. long and the male smaller. They occur as adults in the small intestine of the primary host. Van Cleave has reported the larvae of this species from the armadillo. It seems probable that the intermediate host of this worm is an arthropod and that the larvae in the armadillo represent forms occurring in an unsuitable host. Little is known in regard to the pathology of the worm. Parker reports one dog as having 300 of these worms present.

Little seems to be known in regard to treatments for thorny-headed worms. Calandruccio has reported that he was successful in relieving himself of an intentionally acquired infestation with an echinorhynch, *Moniliformis moniliformis*, by the use of male fern, and this drug would therefore be indicated as worth trying for the purpose of removing these worms.

Echinopardalis pardalis. This parasite of the cat and of numerous wild species of cats has been reported from the cat in the United States once by Curtice under the synonym Echinorhynchus campanulatus. This species is larger than the one just discussed, being from 3 to 4 cm. long. Nothing appears to have been reported in regard to its life history, pathology or treatment.

TONGUE WORMS

Linguatula serrata (Linguatula rhinaria). These worm-like animals are regarded as degenerate arachnids, the group including spiders, ticks, etc. They live as adults in the nasal fossae of the dog, fox and several other animals, and they have been reported as larvae from the liver, lungs and lymphatic glands of a number of animals, including the cat. Cattle are quite commonly hosts of this parasite in the Southern United States. In Europe sheep are the common hosts of the larvae. The adult male is 18 to 20 mm. long and the entire body has annulations

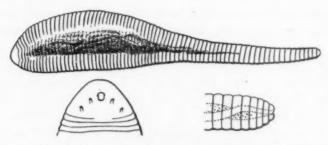


Fig. 25. Linguatula serrata. Upper figure, entire animal. Enlarged. Lower left hand figure, head. Enlarged. Lower right hand figure, female tail, showing utero-vagina (dotted ines) and intestine (solid lines.) Enlarged. From Sambon, 1922.

of almost uniform width. The female (Fig. 25) is 8 to 10 cm. long and the annulations are longest towards the third fourth of the body from the anterior end. Apparently the adult of this species has never been reported up to present time from the United States. However, this August the writer was supplied with a specimen of this parasite by Dr. F. F. Russell, the specimen having been collected from a dog in Atlanta, Georgia. Aside from the fact that this specimen, a female, appears to be the first adult specimen recorded as collected from the dog in the United States, there are other circumstances of interest in this connection. The dog from which the specimen was collected was a case of what we may call the "running disease," or "running fits," which has been so prevalent in the South this year. This disease has received but little attention in the veterinary journals, apparently because the veterinarians who were seeing cases of the disease were at a loss to account for it and had little of a positive sort to contribute to the subject. The dogs in question displayed various symptoms, but the most common and striking was a disposition to suddenly bolt, running wildly for a variable period of time and sometimes running through screen doors or into persons who blocked their paths. attacks came on periodically, the animal apparently being normal between these periods. Apparently the disease was most prevalent in Virginia during May and June, according to Dr. E. S. Allen of Chatham, Virginia, though there were sporadic cases of the disease in August and cases were occurring in North Carolina in July and perhaps later. (Subsequently cases were reported from Ohio and elsewhere.)

In this connection it may be noted that the tongue worm is said by Railliet to rarely cause epileptiform or rabiform attacks. It has seemed possible to the writer that the occurrence of such

symptoms as are presented in this "running disease" might be noted in the case of some dogs in a year in which for some reason there were an unusually large number of these parasites present in dogs. The larvae are quite common in the livers of cattle in the South and the fact that the adult has not been reported from the nostrils of the dog is only evidence of the fact that very few dogs have been examined for parasites in the South, and of these even fewer have been examined to see if there were parasites in the nostrils. These tongue worms are too large to readily overlook if the nostrils are opened and examined, but in the failure to open the head or slit the nostrils, considerable numbers of large parasites may be overlooked for long periods and only found by accident. This disease appears to be a quite new thing and anything that might seem to throw any light on it appears worth investigating. That tongue worms might have some connection with such symptoms as have been observed is, of course, merely a hypothesis. Other worms have been accused of causing rabiform symptoms in the dog, among them being Taenia echinococcus, Spirocerca sanguinolenta, Dirofilaria immitis, Dioctophyme renale and Ancylostoma caninum. While some of these might also be overlooked by veterinarians making a postmortem examination, there appears to be more likelihood of overlooking the tongue worm. "Running disease" has been regarded by some veterinarians as a symptom of a nervous form of distemper, of anal abscess, and of other conditions.

The eggs from the female tongueworm in the nostrils of the dog pass out in mucus or are swallowed and pass out in the feces. When such eggs are eaten by suitable hosts, as by herbivores in grazing, the larvae make their way to the liver, lungs and lymph glands, as a rule, and there develop to the infective stage When dogs swallow larvae in infested tissues, the dogs become infested with the adult tongueworms, but just how the larvae get to the nostrils of the dog is yet a debatable question.

As regards treatment, Railliet states that it should consist in the injection of parasiticidal substances into the nostrils. What substance to use does not appear to have been determined by anyone. In view of the fact that the larvae and adult of this parasite may occur in man, it would appear that unless a treatment left no doubt as to the removal of all parasites present in an infested dog, it would seem advisable to kill the dog.

Prophylaxis is a matter of proper meat inspection with the

disposal of all diseased portions of carcasses in such a way that dogs would not have access to them.

SUMMARY

In this paper the writer has discussed the internal parasites of the dog and cat which have been reported from the United States and its possessions. In some cases the parasites have been reported in the United States only, from some other host and not from the dog and cat, but their occurrence here in any host has been regarded as warrant for mentioning them.

The number of parasites reported is considerable, a total of 47, including the following: Flukes (Paragonimus westermani, Amphimerus pseudofelineus, Opisthorchis wardi, Parametorchis complexus, Cotylophallus venustus, Cryptocotyle lingua, Alaria americana, and A. michiganensis); tapeworms (Diphyllobothrium latum, D. americanum, D. mansoni, Mesocestoides lineatus, Taenia taeniaeformis, T. balaniceps, T. pisiformis, T. hydatigena, T. ovis, T. krabbei, Multiceps multiceps, M. serialis, Echinococcus granulosus, Dipylidium caninum, and D. sexcoronatum); roundworms (Strongyloides stercoralis, Oslerus osleri, Dirofilaria immitis, Spirocerca sanguinolenta, Physaloptera rara, Dioctophyme renale, Ancylostoma caninum, A. duodenale, Uncinaria stenocephala, Necator americanus, Ollulanus tricuspis, Trichuris vulpis, Capillaria lineare, C. aerophila, Trichinella spiralis, Toxascaris limbata, Belascaris marginata, B. vulpis, B. cati, and Oxyuris compar); thorny-headed worms (Oncicola canis and Echinopardalis pardalis); and tongue worms (Linguatula serrata). This list will probably exceed 50 before long, as the writer has been informed of the occurrence of other parasites which cannot be published at this time without infringing on the rights of the persons communicating these findings.

NATURAL VERSUS SYNTHETIC SALICYLATES

There are a few veterinarians and physicians who still think that the natural salicylates are superior to the synthetic.

The Council on Pharmacy, of the American Medical Association, has made a thorough study of the relative value of these, and they report that "There is no difference between the natural and the synthetic product, so far as observable results are concerned."

This is important to veterinarians, because the natural salicylic acid is much more expensive than the synthetic.

SOME TROUBLES MET IN IMMUNIZING AGAINST HOG CHOLERA¹

By E. R. Steel, D.V.M., Grundy Center, Iowa.

It is the object of this paper to discuss from a practitioner's viewpoint some of the troubles met in immunizing against hog cholera and to consider means of overcoming them. The following topics will be reviewed then, only in their relation to immunization: vaccination of suckling pigs; proper age, size, and condition to vaccinate; wormy pigs; pigs with ulcerative enteritis; hog flu; swine plague infection; serum-alone treatment; administration of serum and virus; handling of serum and virus and keeping a record; is all U. S.-inspected serum and virus of the same merit; finally, cost of immunization. If we did not have to consider these factors, truly immunization against cholera would be fool proof. My experience with serum and virus has been both in practice and in production for a short time at the University of California. However, what I say is not official from that institution, but rather from my own observations.

As to what the reaction is that produces immunity to cholera, there is little known. Potent serum, plus virulent virus, plus pig equal immunity, some believe. Another factor—susceptibility, may enter into it; at least, clinical evidence would indicate that it is necessary to consider it, if we are to secure as near 100% immunity as is possible to attain by vaccination.

VACCINATING YOUNG PIGS.

Regarding immunization of suckling pigs, a review of the published data will reveal that it is not safe to adopt it as routine practice, and my own observations corroborate this conclusion. Cahill¹ reports:

"852 pigs weighing 15 to 30 pounds were given 30 cc of serum and 2 cc of virus. That from 52 to 72% of pigs so treated failed to carry sufficient immunity to protect against the disease when exposed to a really virulent infection a short time afterwards."

The pigs were fed garbage which is a virus-carrier, according to Birch². I, myself, have hyperimmunized hogs, from several garbage plants, that had never been injected with a drop of serum or virus. I placed some test-pigs in one of these herds, telling the owner to let them get used to the garbage feed and then try to kill them with their "garbage sickness." They didn't sicken.

¹Read before the Missouri Valley Veterinary Association, St. Joseph, Mo., February 13-14-15, 1923.

Later, I vaccinated "country fed" hogs and put them in the garbage-pens with the same results. They were hogs vaccinated at from 60 to 100 pounds. Cahill's pigs, even though given virus and fed virus-meat, did not acquire a uniform immunity. That pigs given serum-alone, as he reports in the same article¹, retained immunity for six weeks, whereas pigs so treated in the Middle West retained their immunity only three weeks, may possibly be explained by the fact that they were constantly exposed to cholera in the garbage feed. Birch³, of the New York State Experiment Station, also thinks that simultaneous immunization of young pigs can not be recommended. Kinsley⁴ writes:

"In several instances there has been cholera developed in swine that had been simultaneously injected with serum and virus before they were weaned. It may be that an immunity produced in a suckling pig will endure in a considerable percentage of cases until the swine are fattened and marketed, provided there is no virulent outbreak of hog cholera in the immediate vicinity, but it is problematic whether a suckling pig's immunity will be sufficient for breeding purposes."

For my own observations in this problem of immunizing suckling pigs, I will cite cases from my records:

May 31, 1921, I vaccinated with the simultaneous treatment 47 pigs for Mr. S. Sows immune and pigs three weeks old. Used 3 cc of virus. July 18, 1921 (7 weeks later) 10 were sick and later died and showed evidence of cholera. Oct. 7, 1921, more pigs sick and I re-vaccinated the herd of which there were 32 left. Every pig that got sick died, and those I posted showed lesions of cholera. After re-vaccination, no more losses.

September 26, 1921, I vaccinated 109 pigs for Mr. T., of which 49 were suckling pigs on immune mothers that I had immunized the year before, when they weighed about 100 pounds. I did not re-vaccinate the mothers. Pigs were given 3 cc of virus and serum 25 cc. None died while suckling, but every one died within a short time after weaning. The herd was badly infected with cholera and about half the herd died. Immune sows did not sicken and the older weaned pigs vaccinated at this time of treatment did not break later.

May 3, 1922, vaccinated 109 pigs for Mr. K. June 23, called to see the older hogs, vaccinated the year before as sucklings. Cholera symptoms and lesions were evident. Re-vaccinated sows after seven had died. Thirty of 50 of their pigs also died. Three sows vaccinated at the same time as the other sows, only older, were left untreated and they did not sicken.

In talking to serum-producers, I find some of them say that in hypering from farms where suckling pigs have been simultaneously treated, many of the hogs will not stand hypering, whereas hogs vaccinated on the same premises as older weaned pigs do stand hypering.

On the other hand, I have vaccinated with the simultaneous treatment, a few herds of suckling pigs, and later the boars were sold into cholera herds in which only the boars survived. I have not noted any breaks in pigs on non-immune sows, although my experience in this has been limited. I have avoided immunizing

suckling pigs, for after all, it is not a great saving, for many suckling pigs do not live to weaning age anyway. In infected herds I have used the serum-alone treatment, re-vaccinating with the simultaneous treatment after weaning, and under these conditions, I advise early weaning and immunization as soon as pigs are in good condition.

In favor of suckling-pig immunization, we have the work of Niles and Rietz⁵ in which they report:

"171 pigs inoculated on the Station premises and on farms, when 7 days to 6 weeks old, and exposed to hog cholera (injecting each with 2-5 cc of virus) 5 months to 9 months and 26 days later, were found without exception to be immune to hog cholera. There was no difference in immunity in pigs from immune or non-immune sows."

This experiment only carried the test to market age and did not show that the immunity lasted for life, which is the test the practitioner must meet in his immunization work. I note also that in the four experiments on pigs on non-immune sows, that the pigs in all but one litter (of 6 pigs) did not weigh at time of inoculation the second time, what they should at their age; but it is explained that this was a coincidence of infestation with worms and effects of cold weather. However, stunting of pigs by vaccination is one of the drawbacks ascribed to immunization of suckling pigs. Pickens, Welch and Poelma⁶, in discussing the work of Cahill, and of Niles and Rietz, explain:

"It is the fact that the pigs used by Cahill were fed on a garbage diet and hence were under exposure to extreme infection practically all the time. The animals of Niles and Rietz were not garbage-fed and hence did not need the same degree of immunity for their protection. In another experiment which we are conducting, under conditions comparable to those on the average farm, our findings to date coincide with those of Niles and Rietz. Undoubtedly they would not hold in a garbage feeding plant."

Now, sometimes in the field, hogs vaccinated by a practitioner are subjected to very virulent outbreaks of cholera, and even eat hogs dead of cholera, and are kept in yards in which cholera-infected hogs are put from time to time, and they do need a solid immunity to stand the field tests. Considering the data published on the subject of immunizing suckling pigs and experience in the field, I believe the routine practice of simultaneously treating suckling pigs can not be safely recommended at this time.

Then, what is the proper age, size, and condition to attempt immunization? I have considered susceptibility to virus as a possible factor in securing a solid and as near 100% immunity as it is possible to attain by vaccination. In inoculating virus-pigs, I noticed that pigs 50 to 90 pounds and in good condition proved

the most uniformly susceptible. In talking to other producers, I have been told that this is usually their experience. Experimentally, Pickens, Welch, and Poelma⁶ showed that:

"Many pigs born of and suckling immune mothers, from ages 2 to 55 days, withstand exposure to one cc of hog cholera virus. Most pigs weaned at ages 48 to 78 days, which have been born of immune mothers, usually contract hog cholera after exposure to one cc of virus when not previously immunized."

On the other hand, Dimock⁷ writes:

"The best time to vaccinate pigs is when they are from eight to sixteen weeks of age, or ten days after weaning. However, on infected premises, it is necessary to vaccinate the pigs at from 2 to 4 weeks of age. When this is done, it is advisable to revaccinate, by the serum-virus method, six to seven weeks later on after weaning. Suckling pigs, even from immune sows, if on badly infected premises, will frequently contract the disease."

Following immunization of thrifty, weaned pigs, I have injected them monthly with 10 cc of virus, and later hyperimmunized them without losses. Serum companies often purchase their hypers from feeders who are constantly vaccinating additions to the herds, or having cholera exposure at intervals, and in this way they think the immunity is strengthened, for they find the ordinary, vaccinated hogs that have not been exposed to cholera since immunization sometimes break from hypering.

In the field I have never given additional virus to avoid breaks, for by selecting thrifty, weaned pigs I have had no trouble with breaks even though the hogs have been exposed to virulent outbreaks, two or three years after immunization. I have never had to revaccinate a herd and I have had the satisfaction of having seen hogs that I had immunized, the only animals to survive in cholera herds in many instances. However, one herd of runty, starved pigs, vaccinated September 30, 1920, broke Nov. 12, 1920, and of 40 pigs all but 15 died. I had advised against trying to immunize this herd, telling the owner they probably could not be immunized for they might not react to virus. Six sows treated at the same time, with the same serum and virus, did not break. Susceptibility may be a factor in immunization.

Birch³ believed that natal immunity may be a factor both in pigs from immune and non-immune sows. He writes:

esting to observe that although natal immunity and serum-alone immunity in young pigs are regarded as being of the passive type, there appears to be a distinct difference between the two: if virus and serum are given while natal immunity still persists, active immunity is not conferred; but virus and serum, administered during the existence of passive immunity due to serum alone, usually, if not always, produce active immunity."

After preparing charts showing susceptibility of young pigs to cholera, he concluded that 12 weeks was the minimum age that he preferred for giving the simultaneous treatment. Although natal immunity in garbage-fed hogs is stronger than in country-fed hogs, this coincides with observations in the Central West, for generally speaking, cholera does not develop until after the weaning age.

In a recent paper entitled, "Natal and Artificial Immunity of

Young Pigs to Hog Cholera," Birch15 writes:

"There are certain points in regard to susceptibility of young pigs of susceptible sows that have not yet been cleared up. In a considerable number of outbreaks of hog cholera in which there was no record of previous immunization, we have observed the very young pigs showing much greater resistance to the disease than older animals and this observation has been made in so many instances that we have been led to wonder whether this apparent immunity was due to the difference in feeding habits of the sucklings as compared to those of older animals

The usual conception of immunity in the new-born is that it is transferred from the mother to the young either thru the placenta or thru the milk. The latter method is regarded as by far the most universal, but in those instances in which the mother is susceptible and the young appear to be temporarily immune, this immunity cannot be explained on such a basis. There appears to be some feature regarding immunity of the new-born which is not well understood, and this applies

to infectious diseases other than hog cholera."

In selecting thrifty, weaned pigs for immunization, losses may be avoided if the unthriftiness is due to worms, ulcerative enteritis, or other devitalizing influences. I have tried to get my clients to let me see the pigs a few weeks before they wished them vaccinated and I offer this service free. Some of the herds we are called to treat should not be vaccinated for weeks and I have so advised the owner. This last summer, I treated approximately three thousand pigs for worms before immunizing them. I also treated 578 pigs in 8 herds the next day following vaccination giving a combination, santonin-and-oil-of-chenopodium tablet, followed the next morning by two ounces of Epsom salts, in the slop, per pig. No losses occurred and the pigs certainly did well following. I believe it can be done safely if done early, before the reaction to virus.

I also try to stay out of herds having ulcerative enteritis; but I do run into it sometimes. Parts of herds may have it and then, too, if cholera is suspected, vaccination is necessary. I prefer the simultaneous treatment and I increase the dosage of serum 10

cc in apparently healthy pigs and 20 cc to those in the herd visably affected with it. In a few instances I have treated part of badly infected bunches of pigs, in the same herds, with serum and virus, and part with serum alone, and it has so happened that the serum-alone hogs had the larger percentage of losses. Of course, the pigs were dying anyhow, but the virus did not seem to increase the death rate where the increased dose of serum was used. The label dosage of serum can not be followed without discouraging results. As regards the use of virus in this condition, I was unable to find any definite data published. Jacob⁸ gives as his opinion:

"It is extremely dangerous to use virus in an attempt to immunize against cholera until after necrobacillosis infection has been eradicated. This no doubt explains the frequent loss of pigs when a herd is treated with serum and virus, while at the same time results with older and more thrifty hogs are good."

My experience with so called necrobacillosis has been limited to ulcerative enteritis in which multiple ulceration of the mucosa of the large intestine is seen and the pigs show chronic scours. I have not observed it as Dreher⁹ reports, in which diffuse necrosis of the mucosa, with membrane formed almost occluding the lumen of the intestine has developed. As routine practice the immunization of pigs with ulcerative enteritis should not be followed if avoidable, for such pigs may stay unthrifty and losses occur and the vaccination will get the blame. If possible it is better to wait to immunize until the herd is straightened out by intestinal antiseptics, change of lots, and better nutrition by use of slops.

Another condition that causes trouble in immunization is pneumonia, swine plague, hemorrhagic septicemia, or mixed infection as it is variously called. Although I have seen this condition as a herd-disease, its associations were such that cholera as a primary devitalizing influence could not be eliminated. I have never had it appear in any herd which I have immunized when the pigs were well and thrifty at time of vaccination. That it is secondary to cholera, there is no dispute. I have noted that in injecting pigs with virus in the laboratory, some herds of viruspigs will develop it more than others, although the same serial of inoculating virus is used. To me, this condition is secondary to some other devitalizing influence and cholera is by far the most important, although it may be influenced by drafts, chilling, parasitic infestation, and hog flu. I have seen hundreds of hogs die following a diagnosis of mixed infection or hemorrhagic septicemia, and bacterins used in one or more injections. In fact,

the farmers in my community call it "missed infection," because the real cause of death—hog cholera—was not eliminated by vaccination. I have observed it in herds not given enough serum, or given low-potency serum, or later, when the virus was probably not all active, and following serum-alone treatment. Birch¹⁰ states:

"It is true that there are many influences and contributing factors connected with 'breaks' following simultaneous treatment, but if we could eliminate the part played by the filterable virus in such cases we would be a long way on the road toward clearing up some of the problems that now trouble us."

In immunizing herds in which sporadic cases of pneumonia have occurred. I believe it is a real factor that must be reckoned with, and I think that an increase in the dose of serum to all animals in the herd will eliminate to a greater degree the development of these cases following immunization than the administration of mixed infection bacterin along with the simultaneous treatment. I have not found bacterins of apparent value in preventing or curing this disease. Eliminate devitalizing influences and it will take care of itself. I admit there are farms on which the raising of small pigs is very discouraging to the owner and perplexing to the veterinarian. However, I have found that the breeding of the sows, so that the pigs will come all within a few weeks, and thus prevent robbing by older pigs, the special feeding of runts, encouraging the use of alfalfa or clover pasture for small pigs, supplying warm, dry quarters, sanitary surroundings, weaning early and promptly, immunizating against cholera, using an increased dose of serum, has handled this problem on farms on which it was very doubtful that pigs could be raised and the owner had even considered going out of the hog business entirely. If this method is not accepted, older, thrifty pigs may be bought and immunized at once. Benner¹¹ says:

"Pigs have much less resistance to natural infections than do older hogs...
.....We do not think it practical and economical to attempt to vaccinate against swine plague. The activities of *Bact. Suisepticus* should be combatted by immunizing against cholera, by keeping infectious material, and that containing harmful parasites, away from the animals and keeping their resistance high by the practice of sane methods of swine husbandry."

Hog flu, also, must be considered in its relation to immunization against cholera. Low in mortality in itself, it is not dangerous unless cholera accompanies it. I have seen many herds wiped out entirely, the owner thinking he had only flu. In fact, during an extremely virulent outbreak of cholera in 1921, I observed only a few herds in which cholera symptoms were evident exclusively. The only way to eliminate cholera in flu herds, if cholera

is in the neighborhood, is by vaccination. The rapid spread of flu in a herd is a guide, but it is not certain. Also, post-mortem findings are not characteristic and will not eliminate the possibility of cholera. It is easy, in the virus laboratory, to post cholera pigs, but in the field I do not place reliance on lesions, for we find evidence in the same pig of several conditions. Along with autopsy, history, symptoms, elimination of other factors and judgment must be considered. In picking an autopsy pig, I prefer to choose one visibly sick, running a high temperature, off feed, just recently sickened, and not showing symptoms of pneumonia, thumps, diarrhoea or unthriftiness, for with these confusing conditions avoided, cholera may be diagnosed more easily.

From the first appearance of hog flu, I have recommended vaccination against cholera as the only safe means of eliminating that fatal disease, if it is in the neighborhood or on the farm. Due to an aversion to the serum-alone treatment, I have used the simultaneous method. In going over my records, I find I have vaccinated 4,000 hogs having flu. In no instance, except in herds that had been sick a few weeks, waiting for the hogs to get well, have I had losses greater than usually occurs with flu alone. If hog flu hangs on in a herd, cholera should be suspected as being associated with it; but if we wait to see if this occurs, when cholera is in the community, it will allow the cholera to become established in the herd and bad results will follow.

I am convinced that the condition described by Jay¹², as possibly hog flu, is different from flu as seen in Iowa. Feed and exposure seem to have some predisposing influence, but I have found it very readily transmitted to other animals by association. many herds getting it from pigs brought home from fairs by pigclub boys, and spread from this center to neighboring farms, and down roads taking in communities. Jav's belief that "it was an anaphylatic condition and that metabolic changes were in progress that prevented cellular activity in the formation of antibodies injected with the virus of hog cholera ineffective," is not born out in my experience. I have seen several thousand immunized hogs sicken with the flu and with cholera in the community at the same time and even on the same farm, none of the herds I had immunized broke with cholera. In fact, immunized herds will go thru the flu better than those not immunized, it seems.

(To be continued)

THE USE OF THE STOMACH-TUBE IN SWINE PRACTICE¹

By C. E. Juhl, Osage, Iowa.

The stomach-tube has not been generally used heretofore in swine practice, but since oral swine-medication is limited almost entirely to the treatment of pigs for worms, and now that much of the vermifuge is given in oils, the pig stomach-tube can serve a very useful purpose in the future for the administration of these preparations. It is not difficult to pass a stomach-tube in the pig. In fact, the tube can be passed in pigs more easily and with more accuracy than can the tube in the large animals.

The principal difference that confronts one is the inability to palpate the esophagus in the pig, which method is quite generally used in the larger animals to determine whether the tube is entering this passage or the trachea. While most animals will cough, more or less, when a tube is passed into the trachea, they may not give this warning in time, when rapid work is being done, to prevent the administration of a dose of medicine into the lungs. The course of the tube can be determined very accurately, however, by noting the distance it can be inserted. For instance, if the tube enters the trachea it will go only about two-thirds as far as it would if it were passed into the esophagus.

By passing a tube into the esophagus of a dead pig weighing about sixty pounds, it was found that the resisting point was twenty-four inches from the most anterior part of the mouth. The resisting point, when passed into the trachea, was sixteen inches from this point. Measuring on the outside of the body it was found that the xiphoid cartilage was also sixteen inches from the anterior part of the mouth. Therefore, the xiphoid cartilage can be used as a landmark. If a tube is used that is long enough to reach beyond this point, and enough of it is inserted to exceed this distance, there should be no question about the course it is taking.

For pigs weighing from thirty to seventy-five pounds I find that a tube made from a one-eighth to a one-fourth-inch rubber hose (inside dimensions), that does not exceed one-half inch over all, and that is fairly soft and pliable, works very well. It should be at least twenty-four inches long. For smaller pigs a smaller tube should be used. One end of the tube should be equipped with an adapter for the large nozzle of a two-ounce, metal dose-

¹Read before the 35th annual meeting of the Iowa Veterinary Association, Des Moines Iowa, January 17, 1923.



Fig. 1. Getting measurement for proper length of tube.

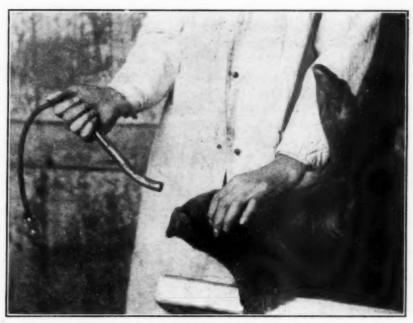


Fig. 2. Method of holding pipe and tube ready for insertion.

syringe. This will facilitate the administration of medicines through the tube.

As a director and guard for the tube, while it is being passed through the mouth of the pig, I use a one-half-inch iron pipe, ten inches long, one end of which has been curved slightly to make it conform somewhat to the contour of this passage. This curvature of the pipe, when properly placed within the mouth, directs the end of the tube onto the floor of the pharynx, which it follows backward, gliding over the glottis and into the esophagus. By taking this course the tube can not easily enter the glottis, an occurrence that at times is very difficult to prevent in passing the tube in the larger animals.

To pass the tube in the pig the animal is held, on its back, in a trough. For convenience the trough should be raised about three feet from the floor. One end of the tube is inserted into the straight end of the pipe and this end, together with the tube, at this point is grasped with one hand and the curved end of the pipe inserted into the mouth, to that place where it drops beyond the heavy part of the tongue. The other hand then clamps the jaws onto the pipe, sufficiently tight to hold it in position. This leaves the first hand free to manipulate the tube. If the head is fairly well extended, the tube will usually pass very easily and directly into the esophagus. It should be inserted far enough to make sure that it has not entered the trachea.

The tube, of course, must be of such size and flexibility as will allow it to pass freely and easily through the pipe, otherwise it will be difficult to distinguish between resistance at the end of the tube and friction on the tube within the pipe. The syringe containing the preparation to be administered is now connected up with the adapter and its contents injected through the tube, after which a small amount of water should be injected with another syringe to clear the tube of any of the preparation that it may have retained.

The tube can also be passed very easily in the mature hog. For this purpose I use a three-fourth-inch, iron pipe, twelve inches long, and a slightly larger and longer tube. The animal is left in the standing position. It is restrained by fastening a rope around its upper jaw and tieing it to a post or other object. Another rope is tied loosely around both jaws. The pipe is then inserted into the mouth and a stick is used to twist the rope which clamps the jaws onto the pipe and holds it in position. The tube is then passed the same as in pigs.



Fig. 3. Tube inserted and dose being administered. Method used for small animals.



Fig. 4. Method of restraint for large animals.

OTITIS MEDIA

By W. F. Guard, Associate Professor of Veterinary Surgery, Division of Veterinary Medicine, Iowa State College, Ames, Iowa.

This condition has not been discussed to any extent, if ever, in veterinary surgery and its occurrence at first thought might seem quite rare to some of you. My own experience has been that the more I study the condition and talk to both veterinarians and breeders, the more prevalent I find it to be. Since beginning to investigate the condition we have observed it in the pig, cat, dog and calf, and can recall many cases previously observed which were undoubtedly affected with this condition but not recognized as such.

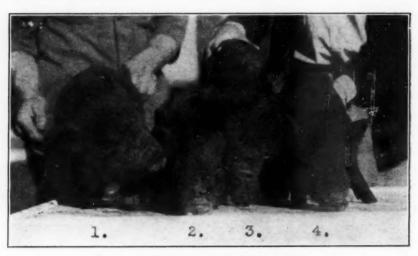


Fig. 1. Chronic suppurative otitis media.

We have frequently been called upon recently to diagnose and suggest treatment, if possible, for five or six pigs in the same herd affected with this condition in various stages of development, the owner stating that he had lost several the previous year showing the same symptoms. Fig. 1 illustrates four cases of chronic suppurative otitis media. Nos. 1 and 3, right ears affected. Nos. 2 and 4, bilateral cases which showed suppurative mastoiditis as complications on post-mortem. Nos. 1 and 3 were treated and are being used for other experimental purposes at present. In addition to this we have had opportunity to treat several cases

¹Presented at the Conference for Veterinarians held at Ames, Iowa, January 19, 1923 and also at the Missouri Valley Veterinary Medical Association Meeting at St. Joseph, Missour February 12-14, 1923.

at the hospital from local herds, and before developing a method of treatment we had opportunity to study the pathology by postmortem examination.

My attention was first attracted to this condition after having seen several hogs down on one side, unable to rise, and if passively turned to the opposite side would immediately flop over to the original position.

HISTORY

The history of these cases was usually as follows: The animal was first noticed holding its head to one side, gradually becoming worse until it walked in a circle toward the affected side, finally going down, unable to rise or even to lie upon the opposite side. These first cases were in the last stages of development and naturally the pathological lesions were quite marked, as will be



Fig. 2. Four cases of the chronic suppurative type.

shown by our autopsy reports. Fig. 2 shows four pigs in the advanced stage of the chronic suppurative type, complicated with mastoiditis, and No. 4 of this group shows meningitis also. These pigs show the poor general condition usually accompanying such cases and also the abnormal attitude of the head and ears. In Nos. 1 and 2 the left ear was affected, in No. 3 the right ear, and in No. 4 both ears were affected.

Later observations and studies convinced me that in these cases showing paralysis we were dealing with the chronic suppurative type of otitis media after meningitis had resulted as a complication. My first conclusion, therefore, was that if we were to treat these conditions successfully we should see them in the early stages before such complications occurred. With this in

mind we have had opportunity to study the condition in various stages of development and have observed the following types:

- I. The acute non-suppurative type
- II. Acute suppurative type with and without complications
- III. The chronic suppurative type with and without complications.

These conditions have been observed involving either one ear or both. The bilateral cases do not, as a rule, present the pathognomonic symptoms of the unilateral cases and require a little closer observation to diagnose. (See Fig. 2, No. 4.)

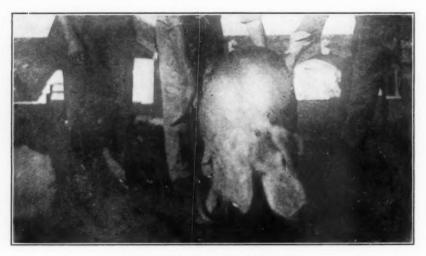


Fig. 3. Acute suppurative otitis media.

1. Acute Non-suppurative Type.

Etiology and Pathology. We believe that in the majority of cases the exciting cause is an acute, nasal catarrh with an extension of the inflammation to the eustachian tube or its postnasal orifice, causing a swelling of the tubal mucous membrane; thereby obstructing the tube and converting the middle ear into a closed cavity. According to W. T. N. MacKinnon, in Clinical Medicine, December 1922, "the air within the middle ear is absorbed and an exudation of serous fluid into the cavity occurs." At any rate, we find some of these early cases where a serous fluid only is found during the operation and we have been unable to demonstrate the presence of organisms either by inoculating tubes or by microscopic examination. In two herds where I recently observed this condition the owner stated that the herds

passed through an attack of "flu," just previous to the development of this condition.

Symptoms. In this type of the disease affecting one ear, the principal symptom is holding the head tilted to one side, with the affected ear down and drooped. In very severe cases the animal may walk in a circle, with the affected ear toward the inside of the circle. If this condition exists for any length of time untreated, it usually becomes infected, thereby changing to the acute or chronic suppurative type.

II. ACUTE SUPPURATIVE TYPE.

Fig. 3. This animal, according to the history, held its head tilted for about six weeks, then went off feed and was presented for treatment. At this time the temperature was 106 degrees, the animal was off feed, and the base of the ear was hyperemic and sensitive. Diagnosis—acute suppurative otitis media, the termination of a chronic otitis media. The tympanic membrane



Fig. 4. Otitis media in a calf. Responded to treatment.

was punctured and the middle ear flushed, but we were unable to establish drainage through the eustachian tube. The temperature subsided and appetite returned, after which the animal appeared normal except for the position of the head and remained so until slaughtered, some eight weeks later, for food. At the time of slaughter the head was examined and a chronic, suppurative otitis media, complicated with chronic, suppurative mastoiditis of the right mastoid process was found. While this animal was not completely and permanently relieved, we believe fatal complications were aborted and the animal was permitted to feed out for the market.

Fig. 4. History. December 10, 1922 the owner noticed that the calf had difficulty in breathing and showed a nasal discharge. Two days later he noticed a discharge from the right ear. These symptoms became worse and the calf was brought to the hospital for treatment. Breathing was so labored that a trachea-tube was placed in the trachea. The auditory canal was cleansed and the tympanic membrane found to be ruptured, so that we could force antiseptic solution through into the pharynx and out through the nostrils. This treatment was repeated daily for a few days until the discharge ceased. The nasal cavities were also flushed daily. Animal sent home December 26th. On February 24, 1923 the owner reported the animal in good condition and no recurrence of any discharge.

The acute, suppurative type may occur secondary to the acute, non-suppurative type, or the infection may be primary, gaining entrance usually by way of the eustachain tube, but may in rare instances become infected through the external auditory canal

and tympanic membrane.

Symptoms. It is usually ushered in with a loss of appetite and an elevation of the temperature, sometimes to 106 degrees F. The affected ear is drooped and if unilateral the head is tilted to one side with the affected ear down. The animal is depressed, dull and may walk or trot in a circle. Pain, sometimes quite acute, is manifested when pressure is placed about the base of the ear. If this condition is bilateral, the head is extended with the nose close to the ground; the animal may walk or trot in this position showing uncertainty of gait, dizziness, or may go in a circle in either direction. Sometimes they do not move, but lie around, markedly depressed and off feed.

Our experience with this type of the disease has been that unless treated at once, serious complications such as symptoms of generalized intoxication and pneumonia may present themselves. sometimes within 48 hours, death resulting shortly thereafter. Upon post-mortem examination of such complicated cases, lesions of septicemia and pneumonia, with metastatic abscesses in the lungs, may be observed. In addition, an acute, suppurative inflammation of the middle ear and eustachian tube may exist, as well as an acute or chronic rhinitis, the mucous membrane of the nasal cavity even being gangrenous in some cases. The tonsils may be badly inflamed and the crypts contain pus. The kidneys and mucous membrane of the bladder may show petechiae. The petrous portion of the temporal bone may be

slightly or quite noticeably movable and the mastoid cells may be somewhat involved.

III. THE CHRONIC SUPPURATIVE TYPE.

Fig. 5, a case of chronic, suppurative otitis media, shows left ear affected, with head slightly tilted and ear of affected side drooped. Chronic suppurative otitis media, without complications, shows about the same symptoms as the other types, except in a milder form, and tends to run a longer course. The animal may not show any loss of appetite and remain in good condition. Upon post mortem the middle ear is found to contain a purulent material, sometimes caseated, and the mucous membrane of the middle ear and eustachian tube thickened. Rhinitis and tonsilitis may or may not be present. This chronic type may become acute at any time, as shown by the record of the animal in Fig. 3.



Fig. 5. Chronic suppurative otitis media.

If the inflammation extends to adjacent structures, such as the mastoid cells, temporal bone or internal ear, we then have the chronic, suppurative type with complications. Fig. 6 illustrates a case of chronic, suppurative otitis media of the left ear with complications. Note the position of the head and the difference in attitude of the ears, as well as the poor general condition. (See also Fig. 2.)

The symptoms and pathological lesions in general are somewhat similar to those already described. However, the animal presents an unthrifty condition, and the cells of the mastoid process may be completely destroyed, converting the mastoid process into a cavity filled with pus. If the petrous portion of the

temporal bone is undermined and loosened, allowing the entrance of infection to the cranial cavity, symptoms of meningitis are then observed. Fig. 7 shows a dog with left ear affected, complicated with suppurative mastoiditis and meningitis as shown by post-mortem examination. If abscess formation occurs in this region, producing pressure upon the medulla, unilateral paralysis follows. In this case the animal goes down upon its side and apparently is unable to lie upon the opposite side. The infection may also pass through the internal ear, along the auditory nerve producing cerebellar abscess. Perhaps internal ear complications are responsible for some cases running in circles.

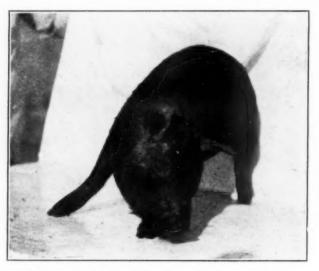


Fig. 6. Chronic suppurative otitis media with complications.

In addition to clinical observations, the Pathology Department has autopsy reports covering 11 cases which may be briefly summarized as follows:

Suppurative inflammation of middle ear and eustachian
tube
Brain abscess:
Cerebellar
Medullary
Purulent mastoiditis 3
Purulent tonsilitis
Lung abscesses 4
Pneumonia
Petechiae on the kidneys
Cloudy swelling of the kidneys 3
Cloudy swelling of the liver
Cloudy swelling of the heart
Discharge from the external ear 1

A case which had a history of running in circles one day and

found dead the next, upon post mortem showed a cerebritis and ventriculitis, the infection having gained entrance by way of the olfactory tract.

BACTERIOLOGY

A pure culture of a Gram-positive, short-chained streptococcus was obtained during an operation upon a pig affected with an attack of acute otitis media. This organism, in conjunction with staphylococci and *Ps. pyocyaneus*, has been found in several other cases examined.

TREATMENT

The treatment is most effective in the early stages of the disease, or at least while the inflammation is confined to the eustachian tube and middle ear. From my own experience with these cases I believe we can expect a permanent cure.



Fig. 7. Dog with suppurative mastoiditis and meningitis.

In the pig it is often difficult and probably impossible to decide definitely, from a physical examination, whether you are dealing with a simple otitis media, or one complicated with a mastoiditis, since you cannot palpate the mastoid process to any advantage. For the same reason, opening this process for drainage seems practically impossible in this species. I have been using the same treatment for these conditions in the pig and believe where the mastoid process is involved the condition may be so relieved as to permit the animal to be prepared for slaughter. (Fig. 3).

In the dog and cat the mastoid processes are accessible both for palpation and operation. This fact aids materially in differentiating between simple and complicated cases in these species. Fig. 8 shows chronic suppurative otitis media involving the right ear, complicated with suppurative mastoiditis. This case is under treatment at present time. Since this picture was taken, Dr. Covault has punctured the tympanum and opened the mastoid process. When the infection has reached the cranial cavity treatment is of no avail.

The tubular portion of the external auditory canal of the pig begins at the inferior angle of union of the lateral and medial borders of the external ear and extends downward, inward and forward to the position of the tympanic membrane, a depth of 3 to 4 inches in the average pig weighing 100 to 200 pounds. The middle ear is a relatively small cavity, lined with mucous membrane, which is a continuation of the mucous membrane lining the eustachian tube. The tympanic cavity (or middle ear) contains the ossicles and communicates with the pharynx through the eustachian tube. Fig. 9 is a schematic drawing of a section of a pig's head, showing the relation of the external auditory canal (A); the tympanic membrane (B); and the eustachian tube (C).



Fig. 8. Chronic suppurative otitis media, involving the right ear, complicated with suppurative mastoiditis.

The object to be obtained in treating this condition consists of overcoming the inflammation of the middle ear and eustachian tube, and thereby reestablishing free communication between the pharynx and middle ear. It is also very important to relieve nasal and postnasal inflammatory processes. By puncturing the tympanic membrane the middle ear is thereby relieved of pressure and may be partially cleansed with warm antiseptic solution. For puncturing the tympanic membrane, a slender flexible in-

strument, about six inches in length, has been found to be most suitable. Since at the present time such an instrument is not to be found on the market we are using a hack saw blade. I find the saw teeth to be a great advantage in that they make secure a film of cotton used in drying and cleansing the auditory canal and middle ear, and also in anaesthetizing the tympanum. I therefore prefer having at least two saw-blades prepared for the operation.

The external auditory canal is thoroughly cleansed and dried. I sometimes apply phenol, 10% in glycerin, for several hours before operating in order to prepare the field thoroughly. An instrument carrying a film of cotton, saturated with a few drops of anaesthetic, is advanced to the tympanic membrane and left in position for about five minutes. The anaesthetic used consists of the following formula: Equal parts of cocain crystals, menthol crystals and phenol crystals, mixed together and allowed to stand a few minutes until a syrupy solution is formed. The

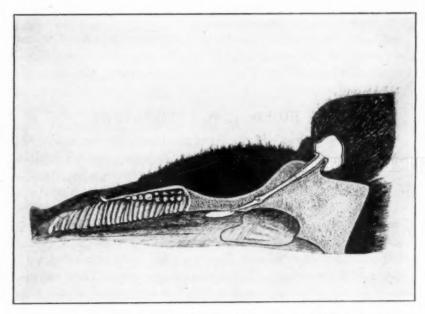


Fig. 9. Schematic drawing of a section of the pig's head, showing relation of external auditory canal (A), tympanic membrane (B) and eustachian tube (C).

plain instrument is now advanced to the tympanum, which offers a certain characteristic resistance. By applying slight pressure you overcome this resistance, the instrument enters the middle ear, and then meets firm resistance by striking the medial wall. Before cleansing the middle ear cavity with antiseptic, the head and particularly the nostrils are lowered so as to supply better drainage and avoid complications.

A two-ounce dose-syringe, with slender nozzle, is very convenient for injecting solutions into the ear. Sometimes repeated injections are necessary before the solution passes out through the nostrils, unless considerable pressure is used. Pressure is avoided in human surgery because of the danger of spreading the infection into the mastoid cells. I find I get best results by using Bipp and, if necessary, applying a little pressure. Bipp, as recommended by Rutherford Morison in his Bipp treatment of war wounds, consists of the following ingredients:

 Iodoform
 2 ounces

 Bismuth subnitrate
 1 ounce

 Liquid paraffin
 1 liquid ounce

The amount of the liquid paraffin varies according to the consistency desired, that is, liquid or paste. For use in these cases we use sufficient stanolax to produce a liquid of proper consistency for use in a syringe.

Very few treatments seem to be necessary especially in the early stages of this condition. When free drainage is established through the eustachian tube, I believe treatment can be safely discontinued.

NEW BIOLOGICAL LABORATORY

Announcement has been made of the incorporation, under the laws of Ohio, of the Columbus Serum Company, with a capitalization of \$50,000. The address of the new concern is: 2025 S. High St., Columbus, Ohio. Buildings were started January 15th, and will be completed April, 1923, at which time the production of hog cholera virus and anti-hog cholera serum will be started. A production schedule for this year calls for five to eight million cubic centimeters. The new Company will operate under a U. S. Veterinary License and sell to veterinarians only. They will also engage in the distribution of a full line of general supplies for veterinarians.

The officers of the Company are: President—Mr. E. C. Irvine; Vice-President—Dr. F. A. Lambert; Secretary-Treasurer—Dr. P. C. Hurley. Production will be under the direction of Dr. Hurley, while the business management and sales will be handled by Dr. Lambert, both of whom are widely known and experienced in their respective capacities.

TRAUMATISM OF THE ABDOMINAL AND THORACIC CAVITIES¹

By Dr. R. M. Phelan, Sharon, Pa.

In presenting this paper it is not my intention to tell of any new discovery or treatment of this very aggravating disease of cattle, but to recount some of my own experiences extending over a period of twenty-eight years of active practice, in order to bring out an animated discussion of its relief when relief is possible, and also to try to arrive at an early diagnosis of the existing condition. Traumatisms of the abdominal and thoracic cavities may be divided into two classes: (1) traumatism of accident from external causes and (2) traumatism from swallowing hard or metallic substances.

We will first discuss the causes of traumatism from external violence as I have seen them. The most common one is caused by the sharp horns of some other member of the herd penetrating between the ribs or perforating the abdominal walls. Also we have as an external cause perforations from sharp sticks, the extension on the ordinary farm gate, the stepping on one end of a pointed rail or post, causing the animal to tilt the object on end and the movement of the cow forward will cause the object to penetrate the abdominal wall, with the well-known resulting hernia of omentum or viscera. Then we have those caused by kicks from horses, and lastly one case that came to me having been caused by the long tusks of a vicious boar hog.

Next we have those cases so familiar to the veterinarian of experience, caused by swallowing of foreign substances: nails, screws, fence-wire, forks, glass, in one instance a three-and-a-half-inch gear-wheel, plugging the outlet to the stomach, in another a twenty-six-inch umbrella steel in its original shape, large darning needle, an ordinary bag needle and in fact any object that it is possible to get down the oesophagus the cow will swallow.

N w we come to what is in my opinion the most important consideration of these cases, namely, the diagnosis with its accompanying prognosis, for I know of no class of disease that can make or break the average veterinarian like these cases. His ability to make a correct diagnosis will cause his client to say, "Why that man can see right through a cow." And if he

¹Presented at the fortieth annual meeting of the Pennsylvania State Veterinary Medical Association, held at Harrisburg, Pa., January 23 and 24, 1923.

fails to make a correct diagnosis he will hear that his client has told his neighbor that, "That damn fool couldn't doctor a cat."

The symptoms in the early stage of this trouble are very apt to be misleading, the animal showing the ordinary symptoms of indigestion. In a very short time we have the familiar grunt, the head carried low, the fever, the tendency to want to lie down with the neck extended, with the under jaw flat on the floor, and a tendency to extend the tongue from the mouth, similar to a cow just freshened. As the disease progresses the elbows are turned out from the sides, the eyes recede in their sockets, and in those cases where the object has punctured the diaphragm and pericardium, the presence of traumatism can be definitely diagnosed by the "slopping" sound of the heart, as it beats laboriously in the pus-filled pericardium. As the disease progresses to a still nearer fatal termination you have a dropsical swelling, starting in the lower cervical region of the brisket, and extending backward, of a profuse, boggy nature, often five to six inches deep and extending clear back to the abdomen.

The prognosis and treatment of these cases are, as a rule, not satisfactory, for the very good reason that when the cow was at that stage of her trouble where skillful treatment would have saved her life, her owner has given her a dose of Epsom salts, thinking she had indigestion, and by the time the veterinarian is called the perforation and pus formation have taken place, and treatment and prognosis are decidedly unfavorable. When, by the ordinary symptoms, we are reasonably sure of our diagnosis of stomach traumatism, our only recourse is rumenotomy. If this is performed early, the patient will recover in nearly all cases; if neglected or postponed for a day or two, and ingesta have escaped into the abdominal cavity, or an abscess has formed at the point of puncture, your prognosis is one of fatality.

However, with the knowledge and consent of the owner, rumenotomy should always be attempted in those cases which show no evidence of pus. If allowed to go on, they will invariably die, and this operation might save her. Rumenotomy in those cases where dropsical swellings have developed should not be attempted; the disease has passed the stage where treatment would do any good. As regards individual cases that have come up in my own experience, I might note that of the umbrella steel, that of the gear-wheel, that of a hay-hook, inserted with malicious intent, deeply into the vaginal wall, that of a chestnut limb found imbedded between the udder and abdominal wall

and entirely healed over for a month, but finally suppurating out of its bed, that of a stake between the scapula and ribs, and lastly the traumatism caused by an excited foreign woman, whose cow becoming suddenly tympanitic, she attempted paracentesis with the butcher knife, and as the knife descended in her muscular grasp, the cow ascended in a wild leap, with the result that stomach movements took place through an entirely new channel.

VACCINATION AGAINST BOVINE INFECTIOUS ABORTION¹

Many of the best veterinary bacteriologists have been working for years on the subject of vaccination as a means of controlling abortion. Thus far their efforts have had no practical value in the solution of this perplexing problem.

Most of our best authorities believe that a high percentage of abortions in cattle are due to the Bang bacillus. The use of dead Bang bacilli as a prevention for abortion has been found practically worthless. The use of a suspension of the virulent organisms would be a dangerous means of producing bovine infectious abortion in a herd that is free from the disease. Its value in infected herds has yet to be demonstrated.

It is illegal in Pennsylvania for anyone to use vaccines which contain the living organisms of disease without first having obtained a permit to do so from the Bureau of Animal Industry. Certain other states have similar laws.

Live stock sanitary officials are conducting experimental tests on a few carefully selected herds. Until it has been authentically proven that a safe and efficient plan has been developed, the work of vaccination against bovine infectious abortion should not be attempted or recommended by the private practitioner.

C. J. Marshall.

Considerably over one-third of the automobile emblems we have sold so far this year have been purchased by California veterinarians. We hope that this is an indication of prosperity among our brothers in the Golden State. The climate, of course, has nothing to do with it.

¹From the University of Pennsylvania Bulletin, Veterinary Extension Quarterly, Number 9.

CONCERNING STERILITY

By S. Sisson, Ohio State University, Columbus, O.

May I suggest that the Editor and the Executive Board might perhaps have availed themselves of the authorization contained in Section 7.K. of the Constitution of the American Veterinary Medical Association "to withold from the Journal, in whole or in part, any paper or part of proceedings, etc."?

The reference here is to part of the Proceedings of the St. Louis meeting of the A.V.M.A., printed in the February number of the Journal, on page 658 et seq. Special attention is called to the colossal conceit involved in parts of the first paragraph of the address on sterility—if we take it seriously; perhaps it was intended to be humorous. If the latter, it may be dismissed as being merely in bad taste in the discussion of a serious and difficult problem before a professional audience.

The writer is not a pathologist or a clinician, and therefore leaves to his colleagues in those branches the duty of attending to the vagaries of some sterility propagandists with which we have been deluged for some time past. On the other hand, he feels somewhat at home in discussing matters which involve anatomical data. In this connection attention is invited to the following statement on page 659:

"A man, if he is adept at all, can become so proficient in the work that up to about three months he can tell within three or four days how long the animal has been bred; in other words, you can tell a six weeks' pregnant animal or you can tell a six and a half weeks' pregnant animal."

The speaker was perhaps not aware of the fact that in the case of two domestic animals only, the pig and the chicken, have the average lengths of embryos at various ages been determined by competent embryologists with any such accuracy as is implied in the claim made above. There are no "Norm-Tables" of bovine embryos, and the amount of reliable information on the subject is unfortunately negligible. This circumstance may seem strange to anyone not familiar with the methods used in such investigations. The fact is that no veterinary anatomist, in this country at least, has ever had the necessary time, facilities, or material for such an extensive research. How long is an average bovine embryo of six weeks? What are the limits of variation in size of embryos of this age or any other age? What is the usual increase in size of such an embryo in three or four days? Have the beef breeds of cattle a more "flabby" uterus than the Guernsey

or Jersey? Can the normal uterine (or Fallopian) tube of the cow be palpated with any certainty, or in fact at all, per rectum?

A little further on the speaker said:

"There doesn't seem to have been much said relative to the arteries that supply the uterus with blood. Without the examination or without the knowledge of the posterovaginal artery, its size and its beat, I would be nonplussed many a time."

Why did not the speaker enlighten us concerning this "posterovaginal" artery? It is entirely unknown to anatomists, who are familiar only with anterior, middle and posterior uterine arteries. Is it behind the vagina, as the new name would indicate, or was the reference to the middle uterine artery, which naturally is the one used by properly-informed clinicians to determine the evolution of the gravid uterus?

In cautioning practitioners that in examining the uterus *per* rectum they were not trying to reach the liver, he added:

"You are not in any further than your wrist."

His hand must be exceptionally long.

Some interesting statements were made during the discussion by another specialist. One of these was:

"The ovaries of the cow can be very readily palpated."

This statement will be readily agreed to, in so far as it applies to those who have had the necessary training in anatomy and physical diagnosis and some clinical experience, but the speaker must be aware of the fact that most of his hearers who were not recent graduates of the better schools have not had adequate training in college in this respect. Why did he not give them some accurate information concerning the most usual position of the ovary and the more common variations therefrom; its average distance from the anus in cows of medium size; what landmarks could be used to locate it, etc.?

Further on, the speaker distinctly gave the impression that a large *corpus luteum* causes pressure-atrophy of the ovarian tissue. Is there any evidence of this? The statement that

"We have the false and the true corpus luteum, and we have them forming every time that ovulation takes place."

is decidedly ambiguous. But there is no ambiguity about the sentence:

"But in case of fertilization it starts to grow and grows to a size of an ear of corn."

The writer has observed a good many corpora lutea and is quite familiar with corn, but never thought of making this comparison. However, it was perhaps merely a lapsus linguae, but would seem to connote also a lapse from the accuracy of thought and expres-

sion which a professional audience rightfully expects from an expert.

The term "suppression of the *corpus luteum*" is incorrect and should not be permitted to secure a standing by usage; the proper word is "expression." This is not merely a personal opinion; reference to standard medical dictionaries will validate it.

The statement that

"The vagina is lined with stratified squamous epithelium, and this heavy epithelium protects the organ against infection."

is in part, at least, incorrect. In the chief domestic animals the vagina is lined with transitional epithelium, a type which is not thought to confer any great immunity. It is only about three or four cells thick and the superficial layer cannot be classed as squamous; some of these cells are flattened a good deal, but the majority are distinctly columnar. The differences in this respect seem to be temporary and due to the varying amount of secretion in the cells. It is to be hoped that the use of the word "heavy" in such a connection will not become at all general.

Several statements of an anatomical nature concerning the cervix uteri require notice. It was said to be "made up of fibrous tissue." The fact is, of course, that its chief constituent is unstriped muscle. The amount of fibrous tissue in its wall is relatively quite small in the normal condition. Of course, fibrosis can occur here as anywhere else. It might, in fact, be confidently expected to result from some procedures which have been recommended to the practitioner by some members of the profession whose knowledge and judgment are apparently not in conformity with their energy and enthusiasm.

The writer is unable to understand this sentence:

"It (the cervix) is composed of about three annular rings and has longitudinal layers of mucous membrane, and these crypts or folds are rather deep."

No great fault can be found with the statement that:

"The body of the uterus is rather short."

The speaker was conservative in so expressing the fact that the length is about an inch and a half. He omitted to state that this fact cannot be determined by palpation.

In the next paragraph we are informed that "the corpus luteum invariably is slightly elevated,"

and almost in the same breath we are told that in some cases "there is no elevation at all, and the only difference is that this overy

is larger than the other."

The writer admits freely that this is too much for the "old bean", and suggests rather feebly that the speaker might have added to the confusion of his hearers by informing them that in a decided

majority of cases the right ovary was larger than the left one.

Mention was made of the prostate "glands" (of the bull) as being "rather lobulated", and it was said that they

"can be enlarged rather rapidly and rather easily palpated."

The prostate is regarded by anatomists as a single, not a double structure. In the bull almost all of it is practically a part of the wall of the urethra. The only exposed part of it consists of a transverse band, half an inch or less in thickness, which lies upon the anterior end of the urethra and is partly under cover of the vesiculae seminales and ductus deferentes. It seems decidedly doubtful whether it can be palpated per rectum with any definiteness unless considerably enlarged. The literature does not appear to contain an account of any authentic cases of prostatic hypertrophy in the bull. In this connection it may be related that a few years ago a veterinary pathologist demonstrated to his class a supposed case of prostatic hypertrophy in a large boar (which has a prostate similar to that of the bull); the so-called "greatly enlarged prostates" were normal bulbo-urethral (or Cowper's) glands. The prostate had not been exposed to view at all, and appeared to be quite normal.

There seems to be a need for good terms to distinguish between a corpus luteum associated with pregnancy and one which is not. The adjectives "true" and "false" are much used, but cannot be regarded as satisfactory. The terms used by the speaker quoted above, "retained corpus luteum" and "corpus luteum of pregnancy" would seem to be a decided improvement. So far as the writer is aware, we have few if any reliable data as to the persistence of the corpus luteum and its usual reduction during pregnancy. It should be noted in this connection that the fibrous stage (corpus fibrosum) in the involution of a corpus luteum cannot always be distinguished from the similar stage of the atretic (Graafian) follicle. There appears to be a good deal of misapprehension concerning the recognition of corpora lutea, even on inspection of the ovary after removal of the latter. The writer recently examined and sectioned a number of ovaries which had been used by an expert on sterility in an address and demonstration before a large state association. One of the ovaries showed what appeared on very cursory superficial examination to be a typical corpus luteum and it was so designated by the speaker. The prominence was 1.5 cm. in diameter and projected 0.5 cm. from the adjacent surface of the ovary, from which it was clearly defined by a neck. On section it was quite evidently

ovarian tissue with the exception of a strip only 2 mm. wide along a small part of the edge, which was quite as clearly corpus luteum. The bulk of the latter occupied the central part of the ovary; it was 1.8 cm. long and 1.2 wide on section and most of it was covered by a layer of ovarian tissue 0.5 cm. thick. Of course a careful and well-informed observer would not make the mistake of demonstrating a prominence such as this as a corpus luteum. But this is not the first time that the writer has observed this error on the part of sterility experts. Such an arrangement of the ovarian tissue, with a large central corpus luteum almost entirely extruded from the surface of the gland, is not rare. But it seems to have escaped the attention of at least some of the experts. More than once the writer has been amused by watching an expert attempt to express such a prominence before a veterinary How can such a prominence be distinguished per rectum from a corpus luteum? The writer admits freely that he is unable to make the distinction by the sense of touch alone.

Criticisms such as those made above are not pleasant to make, nor are they merely destructive. A professional man who, as an expert, speaks before or writes for his colleagues cannot evade his responsibility for accuracy by saying (usually afterward) that he is not an expert on anatomy, pathology, etc. He is naturally and properly expected to have used due care in verifying all of his data. Neglect of this precaution is reprehensible, for the evident reason that members of the profession—especially the younger ones—may easily be misled and caused to adopt ideas which are more or less seriously erroneous. And, more serious still, they are likely to lead to clinical procedure which brings results that are embarrassing or disastrous as the case may be.

The campaign against sterility is one of the most important movements ever initiated by our profession, and is fraught with corresponding possibilities for good or ill, both to the live stock owners and the veterinary profession. Therefore we, as a profession, cannot take it too seriously. At present our methods in this regard seem to be more largely empirical than one could wish. As in all such problems we are dependent for success on careful investigations by well-trained and able men of the fundamental underlying facts, upon which our clinical and hygienic procedure must be based. Zeal without knowledge is still vain.

RABIES VACCINE CANINE. SINGLE DOSE TREATMENT¹

By John Reichel and J. E. Schneider

Glenolden, Pa.

The purpose of this experiment (No. 127) was to determine whether or not a "dead" or non-infective vaccine was equal to a "live" or infective vaccine, as an immunizing agent in the single-dose treatment.

Thirty-five dogs, ranging from 6 to 34 lbs. in weight were injected subcutaneously on June 23, 1922 as follows:-

TABLE 1

Dogs	Lot	Amount Injected Subcutaneously	
5	(A) Live vaccine 1 day old	5 cc	
5	(B) Dead vaccine 1 month old	66	
5	(C) Dead vaccine 9 months old	64	
20	(D) Dead vaccine 1 month old	6.6	

By September 23, 1922, twenty dogs were alive and apparently normal. Fifteen of the thirty-five originally injected died of various causes and minor derangements. When the cause of death was not determined, two rabbits were injected subdurally with the brain emulsion, and held long enough to prove that rabies was not present.

On September 23, 1922, the twenty remaining dogs, and nine previously untreated dogs for controls, were injected intraocularly with 0.1 cc of the "street virus." (The history of the "street virus" is as follows: From dog to man, 6-8-22; to rabbit No. 361, 7-3-22; to rabbit No. 650, 7-24-22; to dog No. 6, 8-22-22; dog died of rabies 9-18-22. The brain of dog No. 6 was used as the "street virus.")

TABLE 2

Dogs	Lot	Amount Injected Intraocularly	Alive 1-23-23	Dead of Rabies
3	(A)	O.1 ee	2	
2	(B)	44	0	1
5	(C)	46	3	
10	(D)	46	2	
9	Controls	44	0	9

Although twelve of the previously treated dogs died after receiving the injection of "street virus," only one of these died of

¹Presented at the fortieth annual meeting of the Pennsylvania State Veterinary [Medical Association at Harrisburg, Pa., January 23 and 24, 1923.

rabies. The other eleven died from other causes all proven not to be rabies. Moreover, all nine control dogs died with clinical rabies, eight cases of which were established by animal inoculation.

SUMMARY

1. "Dead" rabies vaccine, in the single-dose treatment used, can be said to have immunized and protected, since (1) five out of the twenty treated dogs remained alive for more than 100 days after the injection of "street virus"; (2) only one out of the twenty treated dogs developed rabies after the injection of "street virus"; (3) all nine untreated dogs developed rabies after the injection of "street virus."

2. To avoid a high percentage of accidental deaths in an experiment of this sort, the dogs should be kept in individual cages,

properly housed and carefully rationed.

3. A clinical diagnosis of rabies must be supported by the results of the subdural injection of two rabbits with the brain emulsion of each dog.

VETERINARIANS AS LEGISLATORS

Dr. Harris B. McDowell, of Middletown, Delaware, is Senator from the 7th district (New Castle County), in the Delaware Legislature.

Dr. W. A. Haines, of Bristol, Pa., who is a member of the Pennsylvania State Legislature, has been made Chairman of the Agricultural Committee and a member of the Appropriation Committee.

Dr. A. S. Cooley, of Cleveland, Ohio, is again a member of the General Assembly of Ohio, as Republican representative from Cuyahoga County. Dr. Cooley is a former President of the Ohio State Veterinary Medical Association, and has long been a very active member of the American Veterinary Medical Association. A letter just received from Dr. Cooley states that he is very busy with legislation having to do with a gasoline tax, road matters, blue-sky laws, old-age pensions, chiropractors and minimum-wage questions.

The odor of iodoform may be removed from a mortar by washing first with a caustic soda solution, then rinsing with a little denatured alcohol.

STUDIES ON INFECTIOUS ENTERITIS OF POULTRY CAUSED BY BACTERIUM COLI COMMUNIS

By C. C. PALMER and H. R. BAKER

Department of Animal Industry, University of Delaware, Newark, Delaware

A disease affecting chickens, turkeys and ducks, which the writers have characterized Infectious Enteritis, came to the attention of one of us about two years ago, but it did not receive serious attention until the past year, when it assumed epizootic proportions, infecting a large per cent of the poultry flocks in Northern and Central Delaware. This outbreak seemed to start during the Spring months of 1922, in the extreme Northern end of the State. At least, the first birds coming into the laboratory for diagnosis came from this section and the disease gradually spread southward. In the Fall, it was found in the central part of the State. It is impossible to estimate the total number of birds infected, as many owners failed to report the disease. Efforts to check the outbreaks were at first unsuccessful and during this time the mortalities ran at a high rate and many flocks suffered heavy losses. The epizootic greatly decreased with the advent of freezing weather, although some new outbreaks and recurrences on farms where the disease previously existed are coming to our attention.

HISTORICAL

Other workers have reported the presence of Bacterium coli-like organisms in diseases, some of which closely resemble the Delaware outbreak. The first report of this kind that we are able to find was made by Lignieres¹ (1894). He states that a virulent type of the colon bacillus had caused the death of many fowls on a poultry farm. The fatal cases showed the following lesions: The comb was somewhat darkened, but not nearly so much as is usually

The comb was somewhat darkened, but not nearly so much as is usually found in cases of fowl cholera. There were evidences of diarrhea. The blood was found clotted in the ventricles. The lungs, liver and kidneys were normal in appearance. The spleen was slightly enlarged and soft. The intestines were congested and hemorrhagic in places. There was a small quantity of serous exudate in the abdominal cavity. He isolated, in pure culture, from the blood, liver and spleen, a small, motile, Gram-negative bacillus, with rounded ends. The organism was twice as long as wide. The cultural and biochemical reactions of the organism in carbohydrate broth, milk, gelatin, agar, and peptone broth were similar to the colon bacillus.

milk, gelatin, agar, and peptone broth were similar to the colon bacillus. Klein ^{2,3} (1889), described under the name "Grouse Disease," an infectious disease of grouse (*Lagopus scoticus*), caused by a microbe of the *Bacterium coli* group, and characterized by congestion of the lungs, necrotic areas in the liver, and patchy redness of the intestines. There was marked emaciation of the carcass. The heart was filled with coagulated blood. Bacteriological studies resulted in the isolation, cultivation and successful inoculation of a pleomorphic micro-organism which, according to Klein's description and further studies by Dr. Theobold Smith,* proved to be a variety of *Bacterium coli*.

^{*}Mentioned by Dawson.

Francesco Sanfelice⁴ (1895), described an epizootic of pigeons which was caused by *Bacterium coli*. Examination of dead birds revealed a sero-fibrinous exudate in the peritoneal cavity, an abnormal amount of abdominal fluid, enlargement of the spleen and adhesions of the intestine to the heart and liver. The exudate appeared to form a false membrane, which would hold together if grasped and lifted with forceps. The oviduct in some pigeons was also inflamed and covered with a purulent exudate.

Cultures in gelatin and agar and smears on slides were made of the peritoneal exudate, organs and heart-blood Pure cultures of Bacterium coli were obtained, and smears stained with carbol-fuchsin exhibited short, plump, round-ended bacilli. Sometimes preparations of the heart-blood showed

bipolar organisms resembling Bacterium avisepticum.

Fiorentinis (1896) isolated from cases of hemorrhagic septicemia in swans, an organism showing polar staining, but differing from the bacillus of fowl cholera. He states that it grew like *Bacterium coli communis* on solid culture media, but does not record the action of the organism upon carbohydrate media. His drawings and description, however, lead one to think that pro-

bably he was dealing with a virulent colon bacillus.

Martel⁶ (1897) reported finding a virulent colon bacillus infecting hens and turkeys. He reports that hens, killed on the sixth day of their sickness, presented emaciation, evidences of diarrhea, somnolence and conjunctivitis. On autopsy he found pericarditis, with an abundant false membrane*, without much liquid, congestion and friability of the spleen, inflammation of the small intestine and the caeca and suppurative conjunctivitis of the right eye. From the blood, liver, false pericardial membrane and the conjunctivitis exudate, he isolated a bacillus, and upon studying it culturally and biochemically, it proved to be a colon bacillus. The turkeys which died of the same malady, showed symptoms and lesions similar to the hens, but the organism he found in the turkeys was not so virulent as the one obtained from the hens.

Dawson⁷ (1898) investigated a poultry disease outbreak in the vicinity of Washington, which corresponds in symptomatology and pathology, to the Delaware outbreak. Dawson, however, did not recognize the causative organism to be Bacterium coli, but called it Bacterium astheniae and named the disease "going light," or infectious asthenia. He states that the most noticeable condition of the sick birds was their extreme emaciation. Other symptoms were: voracious appetite, and comb and wattles slightly paler than is usually found to be the case. There was no diarrhea or increase in body temperature. The disease was a chronic one, lasting about three months before a fatal issue. In the flock were 350 fowls, of which 30 had died and 100 were sick. As the disease made itself known only through loss of flesh, the poultry owner and his neighbors called it "going light." Post-mortem examination revealed an extreme emaciation of the muscular tissue. The duodenum was the only organ noticeably affected. The walls of this structure were highly inflamed and the contents were mucoid in appearance. From the duodenal contents of infected chickens, Dawson isolated, in pure culture, a colon-like organism which would produce acid and gas in lactose, dextrose, and sucrose broth. The organism was non-spore-forming, one to one and one-third microns long and nearly one-half micron wide, often occurring in pairs. It was Gramnegative, did not liquify gelatin, but coagulated milk with the production of acid.

Mazza⁸ (1899) observed an outbreak of a disease among hens that was probably caused by *Bacterium coli*, although from his meagre description of the organism, one could not be certain of the identity. The disease was

characterized by hemorrhagic enteritis.

Joest⁹ (1902) reports finding in three epizootic appearances of dead hens in transport, an organism isolated from the heart blood, spleen, liver and intestinal contents which he called *Bacterium intestinale gallinarum*. In the course of his experiments, he found *Bacterium coli*, as well as the previously named organism.

About 1906, there was a highly contagious and rapidly fatal disease prevailing among quail in this country. Morse¹⁰ received at his laboratory, large

^{*}The writers have encountered this lesion in a number of instances.

numbers of dead or dying quail from various parts of the United States. The symptoms were usually manifested by dullness and a tendency to sit in the corner of the cage with feathers ruffled. The food was neglected and, generally in two or three days, before diarrhea had developed or emaciation made its appearance, the bird was dead. Sometimes the disease ran a more chronic course and though diarrhea was rarely very marked, emaciation became extreme. The post-mortem examination revealed the following: slightly congested; liver congested and presenting a few small areas of superficial necrosis; intestines studded with minute ulcers; spleen always congested, sometimes enlarged, sometimes quite dark." The constant feature, however, was the intestinal lesions. These were generally recognized by the necrotic areas, although sometimes large areas of inflammation were observed. Cultures made from the blood, lungs, liver and intestines gave rise to a rather actively motile, Gram-negative, rod-shaped organism, appearing often as paired ovals, single or paired rods with rounded ends, and even filaments. Polar staining was quite constant, and no spores were ever detected. It was a faculative anaerobe. Its growth on gelatin, the character of gas formation in carbohydrate broth, and its milk-coagulating properties prove it to be a form of Bacterium coli. The bacillus could not always be isolated from the heart-blood or from the lungs. It could usually be cultivated from the liver

in which lesions existed and always from the infected intestines.

Claussen¹¹ (1907) added to the knowledge of colon septicemia by his investigations which he undertook with hens dying during shipment. Claussen found, in the blood of the dead hens. the colon bacillus in pure culture. Other bacteria were not present. The sick birds showed cholera-like symptoms. They sat around dull and drowsy, with a mucous discharge from the closed eyes. They would refuse to eat. Diarrhea was noticed in some of the birds. There was one cock which was especially severely infected. His heavy comb hung down to one side, was partly dark-colored and felt cold to the touch. Some of the sick fowls would recover after three or four days. Upon dissection, the heart was found to be filled with black, partially-clotted blood and the epicardium was covered with small petechiae. The intestinal mucosa appeared slightly inflamed, and the parenchyma of the liver was slightly darkened. A blood-smear of the heart, stained with carbol-fuchsin, exhibited under the microscope, a microorganism very similar to Pasteurella cholerae-gallinarum. One could observe countless organisms, some oval and others spherical, which appeared like bipolar-stained bacteria, lying between or beside the erythrocytes. However, these organisms appeared about twice the size of fowl Claussen found the mortality among naturally infected hens to be about fifty percent. He concludes from his results that "Bacterium coli may, under certain conditions, take on the ability to leave the intestines, become virulent, and cause a septicemia in hens, especially if their resistence has been weakened by hunger, thirst, cold, or lack of good ventilation."

Among several organisms isolated by Hadley¹² (1910) from cholera-like outbreaks of disease in Rhode Island, was a colon organism. This was isolated from the spleen of a bird which had been sick for three or four days The earlier deaths in the flock had been more sudden and before death. without apparent cause. The birds manifested a high temperature and a yellowish diarrhea was present. Upon examination the liver was hyperemic and soft, and the spleen was enlarged. The entire intestinal tract showed severe inflammation. The intestinal contents were blood-stained, indicating a hemorrhagic condition. The liver and heart blood also yielded, in pure culture, an organism which culturally and biochemically corresponded to

Bacterium coli.

Two cases of colon septicemia in hens were reported by Zeiss¹³ (1914). Post-mortem examination revealed no pathological changes outside of a striking softness of the spleen and the liver and a few small subcutaneous hemorrhages. Stained preparations from the internal organs and blood exhibited a mass of oval and elliptical polar-stained rods. An organism was isolated in pure culture which in all respects corresponded with Bacterium coli communis. The organism was very pathogenic for canary birds, but he was unable to infect guinea pigs, either subcutaneously or intraperitoneally. Baudet¹⁴ (1922) isolated from the carcass of a hen, a bacterium which at

first appeared to be a paratyphoid. On further bacteriological studies, however, it proved to be a colon bacillus. This particular strain, however, appeared to be of importance for the reason of its high virulence. A subcutaneous injection of a loopful of the culture killed mice and pigeons in two days. Chickens also proved very susceptible, an intramuscular injection killing them in a few days. The chickens which were used for experimental purposes revealed hemorrhagic enteritis, which markedly simulated the lesions found in the original bird. The same owner lost a considerable number of chickens from the same disease.

SYMPTOMATOLOGY OF THE DELAWARE OUTBREAK

The symptoms of infectious enteritis vary to a considerable extent in different flocks, but to a less degree in individuals of the same flock. This variation is explained by differences in the virulence of the invading microorganism, the general health and sanitary conditions surrounding the flock, and the presence or absence of a secondary disease or secondary invading organism. Typical outbreaks may be considered as presenting acute and chronic forms and rarely a peracute form may be encountered.

The acute form, in which the birds live for several days, may be regarded as the most usual form of the disease, although in such outbreaks some of the acute cases become chronic and may survive for weeks. Often the first symptom noted by the owner in the acute cases is the general or partial paralysis. This paralytic condition resembles the so-called "paralysis" described by Gage ¹⁵, which is so prevalent among the poultry of Massachusetts. Some of these cases resemble botulism and a careful study is necessary in order to differentiate between the two diseases. The paralysis may affect the muscles of locomotion to such an extent that the bird is unable to walk or move about. Other than the paralysis, the bird presents few symptoms during the early stages of the disease.

The appetite usually remains normal, the comb possesses a normal, red color, and the droppings are normal in color and consistency. After a few days, the bird may develop a diarrhea, assume a drowsy or sleepy attitude, and some owners report that the affected birds apparently become blind. Few of the cases showing general paralysis recover, death usually occurring in about one week. Cases showing partial paralysis of one leg, or one wing, or dropping of the tail feathers, are not uncommon. These cases usually assume a less acute form and are accompanied by pronounced emaciation, terminating fatally in about two weeks. Both types of the paralysis herein described may be encountered in the same flock.

The chronic form of the disease is characterized chiefly by

marked emaciation, that is, "going light." It may or may not be accompanied by the paralytic symptoms. We have encountered several outbreaks showing typical, post-mortem lesions and yielding Bacterium coli communis, in which the only symptom was the "going light." In such flocks, the mortality was low. In outbreaks accompanied by a high mortality, the paralytic symptoms invariably predominated and the disease assumed the acute form. In several outbreaks we encountered a peracute form of the disease. In these outbreaks, the birds died suddenly, without warning, often being found dead under the roosts or upon the nests. This form of the disease resembles fowl cholera in its symptomatology. In some outbreaks we have encountered the peracute acute and chronic forms co-existent. The disease was encountered chiefly in chickens, although several extensive outbreaks were studied in young turkeys and in a number of instances ducks were found infected. Guinea fowls raised very extensively on Northern Delaware farms apparently remained free from infection.

PATHOLOGY

The pathology shows as much, if not more, variation as the symptomatology. The variations encountered led to considerable confusion in our early studies, but after examining a great many birds, all having the disease, we have come to the conclusion that in the acute, uncomplicated cases, the post-mortem lesions are very meagre. In the peracute form and in the early stages of the acute form, no macroscopic lesions may be observed upon post-mortem examination. Acute cases that have died, or been killed shortly before examination, invariably present localized inflammatory areas of the intestinal mucosa. These areas may be very small in size and are usually found in the duodenum, near the ileo-caecal openings and in the rectum. Such cases seldom show a congestion of the mesenteric or intestinal-wall blood-vessels, and all other organs remain normal. Birds that have been sick for some time frequently show extensive lesions of enteritis. In such cases the liver and spleen may be enlarged and hemorrhagic and the heart may show a few petechiae. Cases of the subacute and chronic types, while varying considerably, invariably show marked emaciation of the entire musculature ("going light"), absence of fat in the abdominal viscera, and enteritis in varying degrees.

Other diseases, as fowl typhoid and cholera, may exist in the

flock at the same time, and thus serve to complicate the pathological and bacteriological findings. If either one of these diseases exists in the flock, it will predominate in the postmortem picture and bacteriological findings. In a number of outbreaks investigated by the writers, we believe that a complication of diseases existed, the most frequent of which was fowl typhoid.

BACTERIOLOGY

The bacteriology of infectious enteritis is also confusing, as it is not possible to demonstrate, always, the presence of a microorganism in the blood, or in cultures taken from the blood, liver, spleen, or intestinal wall. Cases showing none, or very slight, lesions may give negative bacteriological findings. In cases showing only slight lesions of enteritis, cultures from the blood, liver and spleen invariably remain sterile, although deep, mucousmembrane cultures frequently yield pure cultures of *Bacterium coli communis*. In cases showing extensive enteritis, we have isolated the organism in pure culture from the blood and from the liver.

Reproducing the disease with the organisms isolated has proven successful in some instances, although the results obtained by different workers show considerable variation. reports that experimental subcutaneous and intramuscular inoculations of two-ec doses were fatal for pigeons, but subcutaneous and intramuscular inoculations produced only a local abscess in rabbits and guinea pigs; while inoculations into the pleural or into the peritoneal cavity killed them in twenty-four to forty-eight hours. Lignieres could not produce the disease by feeding cultures to poultry. Intravaneous injections of one to two cc of a peptone-free broth were not fatal for hens or rabbits. but would cause death in pigeons in less than twenty-four hours. Young cultures of his colon bacillus, growing in three percent hav broth, infected intravenously into five hens, killed two of them. One of the dead hens showed lesions identical with those which were infected naturally. He was always able to find the colon bacillus in the blood and viscera of the animals which succumbed to the experimental inoculations.

Sanfelice reported subcutaneous injections of one cc of a broth culture of *Bacterium coli* would not cause death, but the same amount injected into the peritoneal cavity would be lethal for the pigeon. His attempts to immunize pigeons against this

organism were unsuccessful. Birds receiving the subcutaneous injections of one cc of a broth culture would die if he injected, intraperitoneally, the same dose eight to ten days later.

Martel⁶ reported small doses injected into the pectoral muscles would kill hens. On the fourth day following the injection, the blood would be filled with colon bacilli, and lesions would be found resembling those of natural infection. Martel succeeded in infecting guinea pigs, rabbits, white rats and mice with his organism.

Morse¹⁰ failed in reproducing the disease in chickens, pigeons and rabbits, but succeeded in producing death and characteristic lesions in mice and guinea pigs.

Zeiss¹³ was able to infect canary birds but failed in the case of guinea pigs.

Attempts on the part of the writers to infect hens artificially by injecting subcutaneously or intraperitoneally, two cc of a 24-hour broth culture were unsuccessful.

CASE REPORTS

Three outbreaks occurring on different farms have been selected as typical of the clinical forms, namely, the peracute, acute and chronic conditions.

Case I: Four dead hens and one live bird, from a flock of two thousand, were brought to the laboratory. The owner, a poultry dealer, stated that the flock was carefully culled twice each week, and non-laying birds, or those slightly off in physical condition, were removed and slaughtered for the market. The present disease made its appearance suddenly, and the first warning was the finding of the dead hens under the roosts or upon the nests. The owner stated further that there was no diarrhea among the remaining birds of his flock, but those remaining alive for several hours became partly paralyzed shortly before death. The live hen brought to the laboratory had been sick, apparently, a few hours. The bird was partially paralyzed, as indicated by lameness when it attempted to walk. Two of the birds that had died shortly before the owner left home were opened. They revealed the following lesions: liver and intestine congested, intestinal mucosa presenting areas of diffuse hemorrhage in duodenum and near the caecal openings. All other organs appeared to be normal. Cultures from the heart and liver gave pure cultures of Bacterium coli communis. In the

stained smear of the heart-blood, were observed plump, short bacilli. These are shown in the microphotograph, Fig. 1.

Case II: A dead pullet was received from a flock having a clinical history as follows: The first symptom noted by the owner was the tendency for the birds to sit around. Some of them became paralyzed to the extent that they were unable to move about to obtain feed. In this paralyzed condition the sick birds retained a normal appetite and the color of the comb was normal. Later a greenish-yellow diarrhea developed and, in the terminal stages, some of the birds became blind. The pullet had died while on the way to the laboratory and when opened for study revealed: heart normal, liver fragile and slightly congested, spleen enlarged, mesenteric blood-vessels dilated,

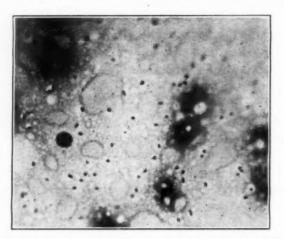


Fig. 1. Smear of heart-blood revealing short plump bacteria and bipolar organisms; x 1,000.

extensive inflammation of the mucosa throughout the entire length of the intestine. Deep mucous-membrane cultures, taken after first searing the superficial layer, gave a pure culture of *Bacterium coli communis*. Cultures from the heart, liver and spleen were sterile.

Case III: In this flock the owner first noticed several hens becoming lame, and some of them carried one wing in a low and abnormal position. He found, upon examining the hens, that they were very light in weight. The appetite was normal and there were no cases showing a diarrhea. The owner brought a hen, which had recently died, to the laboratory for diagnosis. Autopsy revealed all organs apparently normal, excepting areas of inflammation throughout the intestine. These areas were

not extensive and were visible only upon the mucous membrane. Deep cultures from the intestinal mucosa gave pure cultures of *Bacterium coli communis*.

A cultural and biological investigation of the three strains of Bacterium coli communis isolated from the three selected cases of infectious enteritis proved that the organisms belonged to this species of microorganisms. All three organisms were Gramnegative, slightly motile, non-spore-forming, rod-shaped bacteria. Blood smears stained 30 seconds with carbol-fuchsin showed some of the organisms to be bipolar, others to be oval, and some to be in pairs. The organisms did not liquify gelatin, but would coagulate milk by acid production. They were found to be methyl-red-positive when grown in Clark-Lubs medium. Dextrose, lactose, maltose and salicin were fermented with the production of acid and gas. No fermentation occurred in sucrose and dextrin broth.

TREATMENT

Very little information on the treatment of *Bacterium coli* infection may be gained from the literature on the subject. Dawson recommends medicinal tonics for renewal of the lost vitality, easily digested foods and careful housing. Morse recommends calomel in one-tenth-grain doses, as an intestinal disinfectant.

We have found considerable variation in the manner in which infected flocks respond to treatment. An intestinal antiseptic which seems to give good results in one outbreak may be absolutely worthless in another. This variation is doubtless explained by the thoroughness with which the treatment is applied, the sanitary conditions surrounding the flock, and the absence or presence of other diseases. When the treatment is given conscientiously, where no complications exist, and the birds are quartered under fairly good sanitary conditions, we believe lime-sulfur spray is almost a specific for Bacterium coli communis infections in poultry. Lime-sulfur spray is a standard spraying preparation for fruit trees. It may be obtained in concentrated solution or as the pure powder. The lime-sulfur is broken down in the intestine, liberating a form of free sulfur which is readily absorbed by the intestinal mucous membrane.* It may be given directly to the sick birds and is best administered by means of a medicine dropper in 2- to 5-cc doses of a 2 percent solution of

^{*}Further studies of the action of lime-sulfur in the intestines are underway.

the concentrated solution. A one percent solution should replace the drinking water. In addition to this treatment, the birds should be taken from range, quartered in clean houses, on new, well-drained ground. Sick birds should be isolated. If permitted to remain on range, it is difficult to force the birds to drink the lime-sulfur water.

Copper sulfate has given very good results in treating gastrointestinal infections in poultry. After considerable experience with this metallic salt, we have concluded that the best results are obtained when it is administered in sour milk. Birds are very fond of sour milk and this agent alone has been recommended as a remedy for intestinal infections. Our idea in employing it, however, was to find a suitable vehicle for administering the copper sulfate. Birds refuse drinking water containing the copper sulfate, but when the chemical is mixed with sour milk, in the proportion of a teaspoonful (8 grams) of copper sulfate to each gallon of sour milk, a remedy is supplied which is greedily taken by all members of the flock.

When either of the chemicals mentioned fails to bring improvement, we have observed that, invariably, the birds are not receiving the treatment as directed or a disease complication exists in the flock. On one farm, where the treatment failed, we found a heavy infestation of intestinal parasites (Ascaridia perspicillum). In flocks being pushed for egg-production, it is advisable to reduce the grain ration, but allow plenty of green feed and moderate laxative feeds. Changing the flock to new ground and generally improving the sanitary conditions are valuable adjuncts to the treatment.

DISCUSSION AND SUMMARY

Within recent years, and especially during 1922, many Delaware flocks suffered heavy losses from a disease which the writers have characterized infectious enteritis, from the enteritis which seems to be the chief and only constant lesion encountered. The disease has assumed epizootic proportions among chickens, turkeys and ducks. Guinea fowls are apparently more resistant to the infection. The disease is caused by a virulent strain of Bacterium coli communis.

Few writers in this country have reported similar outbreaks. Infectious asthenia or "going light," described by Dawson, and caused by an organism which he named *Bacterium astheniae* is probably the same disease. His description of the organism

proves it to be *Bacterium coli*. Morse, however, reports an extensive outbreak among quail in 1906, caused by *Bacterium coli*. Reports of *Bacterium coli* infections are very numerous in European literature.

Infectious enteritis manifests itself as an acute and chronic disease. The principal symptoms are paralysis in the acute cases and emaciation ("going light") in the chronic form. Diarrhea is seen only in the terminal stages or where the enteritis is quite extensive.

Macroscopic lesions are usually absent in the early stages of the acute and chronic forms. After death, and in the terminal stages, enteritis, as indicated by diffuse hemorrhage of the intestinal mucosa, is a constant lesion. This may be accompanied by hepatitis and splenitis. In many cases the enteritis is the only lesion found.

Bacterium coli may occasionally be demonstrated in the blood, liver and spleen and usually in the intestinal wall. We have failed to demonstrate the organism in a number of outbreaks presenting a typical history and lesions of enteritis. This failure was due to failure in securing several birds for laboratory diagnosis, the absence of the organism in the liver or heart-blood, and too deep searing in the intestinal mucosa preparatory to culturing the intestine. Invariably, when we carried our observations to a number of birds, we secured the organism in pure culture.

A differential diagnosis may be made only by careful bacteriological studies. In the differential diagnosis, one must differentiate between botulism, caused by Clostridium botulinum, fowl typhoid, caused by Bacterium sanguinarium, fowl cholera, caused by Pasteurella cholerae-gallinarum, and fowl pest, caused by a filterable virus.

Different workers report conflicting results in their ability to reproduce the disease in experiment birds and animals. It appears that the infection is readily transmitted experimentally to guinea pigs, rabbits, rats, mice and pigeons, but rarely may it be transmitted to chickens.

Intestinal antiseptics are indicated in the treatment of infectious enteritis. We have obtained satisfactory results following the use of lime-sulfur given directly to sick birds, the same in the drinking water, and copper sulfate in sour milk. We believe we have effectively checked a number of outbreaks by the judicious use of these agents, together with improving the sanitation and regulation of the diet.

REFERENCES

¹Lignieres, M. J.: Septicemie a coli-bacille chez la poule, Compt. rend. Soc. de biol, 1894, xlvi, 135.

²Klein, E.: Ueber eine akute infectiose Krankheit des schottischen Moorhuhnes (Lagopus

**Sanfelice, Francesco: Eine Seuche bei Tauben durch Bacterium coli verursacht, Ztschr. f. Hyg. u. Infektionskr, 1895, xx, 23.

**Florentini, Angelo: Hamorrhagische Septikamie der Schwuane, Cent. f. Bakt. Orig. Abt. I., 1889, vi, 593.

**Forentini, Angelo: Hamorrhagische Septikamie der Schwuane, Cent. f. Bakt. Orig. Abt. I. 1806.

I., 1896, xix, 932.

*Martel, M.: Maladie a coli-bacille de la poule et de la dinde, Compt. rend. Soc. de biol, 1897, xlix, 500.

1897, xlix, 500.

'Dawson, C. F.: Asthenia (Going Light) in fowls, 15th Annual Report of the Bureau of Animal Industry, 1898.

*Mazza, Carlo: Bakteriologische Untersuchungen uber eine neuerdings aufgetretene Huhnerepisotie, Cent. f. Bakt. Orig. Abt. I., 1899, xxvi, 181.

*Joest: Berl. tierarztl. Wochenschr, 1902, Nr. 16.

*Morse, G. B.: Quail disease in the United States, U. S. Dept. of Agri, B. A. I., Circ. No.

¹⁰Morse, G. B.: Qual disease in the United States, U. S. Dept. of Agri, B. A. I., Circ. No. 109, 1907.

¹¹Claussen, L.: Ueber Kolibakterienseptikamie bei Huhnern als Transportkrankheit, Ztsch. f. Infektionskr. d. Haustiere, 1907, iii, 69.

¹²Hadley, P. B., and Amidon, E. E.: A biological study of eleven pathogenic organisms from cholera-like diseases in domestic fowls, R. I. State Col., Bulletin 146, 1911.

¹³Zeiss and Schlegel: Koliseptikamie bei Huhnern, Archiv. f. Hyg., 1914, lxxxii, 27.

¹⁴Baudet, Y.: Coli bacillosis in chickens, Tijd. voor Dierg., 1922. (Abstract in Vet. Med., 1922, xvii, 451).

¹⁶Gage, G. E.: Concerning the diagnosis of Bacterium pullorum infection in the domestic fowl. Mass. Agri. Exp. Sta. Tech. Bulletin No. 5, Aug. 1922, 79.

¹¹Gage, G. É.: Concerning the diagnosis of Bacterium pullorum infection in the domestic fowl, Mass. Agri. Exp. Sta. Tech. Bulletin No. 5, Aug. 1922, 79.

KENTUCKY BREEDERS MEET

On March 8, 1923, a meeting was held at the Kentucky Agricultural Experiment Station for the purpose of discussing feeding and breeding problems. The feeders met in the forenoon and the breeders had their session in the afternoon.

Among those who were on the program of the afternoon session were: Dr. Cassius Way, of New York City, whose topic was, "Prevention and Treatment of Breeding Diseases of Cows and Mares," and Dr. W. W. Dimock, of the University of Kentucky, who presented "A Summary of Investigations on the Cause and Treatment of Sterility in Mares." Dr. Dimock also presented a report on "The Vaccination of Sows against Infectious Abortion." Drs. Way and Dimock also gave "Demonstrations of the Methods of Examining Mares and Cows for Sterility."

Prof. W. S. Anderson and Prof. E. S. Good presented the following subjects, respectively: "Value of Examining Stallions for Potency," and "Prevention of Infectious Abortion in Mares."

A letter recently received from Dr. C. J. Bonsfield, our Resident Secretary for Prince Edward Island, states that he has just experienced the most severe winter in the last fifty years. When his letter was written, the railroad had been blocked for the last twelve days. The snowfall for the winter was about eleven feet, about ninety per cent of which was still on the ground the middle of March.

ACRIFLAVINE

By D. H. UDALL,

New York State Veterinary College, Ithaca, N. Y.

Acriflavine and proflavine are described as follows in New and Nonofficial Remedies, 1922: "Acriflavine and proflavine are prepared from acridine, a base obtained from coal tar; the acridine derivatives are mostly yellow dyes—acridine dyes—to which the term 'flavine' has been applied ('flavine' should more correctly be applied to a vegetable coloring matter) . . .

"A considerable number of bacteriologic and clinical reports of these substances have appeared; however, the results of the studies are contradictory and judgment as to the therapeutic value of these new antiseptics must be postponed."

ADMINISTRATION

In the ambulatory clinic of the New York State Veterinary College the use of acriflavine has become extensive during the past two years. In the treatment of general septicemic conditions, such as metritis and mastitis in cows, it is administered per vein in doses of 80 cc of a 1:500 solution in sterile water. Before injection, a bottle of the solution is set in a pail of warm water until the temperature approximates that of the animal body. The jugular is now raised by means of compression with a one-half inch rope snubbed tightly around the lower part of the neck. After allowing sufficient time for the jugular to become prominently enlarged it is pierced with a two-inch, 16-gauge slip needle. Pressure from the rope is now relaxed and the solution injected with a ten-, twenty- or forty-cc syringe; we use either a Record or a Champion. In young calves about twenty cc is injected.

In acute or chronic metritis it is injected directly into the uterus, after removal of all inflammatory exudate by means of a saline douche. In this case it is used in a 1:500 aqueous solution. Four to sixteen ounces are left in the uterus according to the size of the cavity. More recently, and to a very limited extent, a 1:1000 solution of acriflavine in glycerin has been used for metritis. In the search after an ideal antiseptic for disinfection of the uterus, between the dates of parturition and first service, this combination is receiving a trial. Such routine use of any

disinfectant is of course limited to herds suffering from a high per cent of metritis and sterility.

In severe septicemia, as in metritis or mastitis, the dose is often repeated daily. It has not been observed that daily repetition of 80 to 100 cc of a 1:500 to 1:1000 solution per vein has any ill effect upon bovines. It is probable that an animal may safely receive much larger amounts.

RESULTS

An accurate estimate of the therapeutic effect of any chemical injected into the circulation is difficult; this depends upon extensive clinical experience as well as experimental tests. Enough experience has been obtained, however, to encourage us in the hope that its effects are decidedly beneficial. The most strikingly apparent effects have been observed in the treatment of metritis and mastitis associated with general symptoms. It frequently happens that within twenty-four hours after the injection of acriflavine both the general and local symptoms in mastitis have improved. In acute mastitis, with no general reaction, a similar local improvement following injection is not infrequent.

In this report, written at the request of the Editor for a brief description of its indications and method of administration, it is not possible to submit detailed tabulations based on case reports. It appears to be a useful drug in the treatment of both local and general infections. In the treatment of metritis it has a distinct advantage over iodoform with respect to its influence upon the milk. It does not appear to have any prophylactic effect in the control of diseases of the new-born.

The use of the word "alcohol," without qualification, in the sale of anti-freeze preparations is prohibited. A Federal regulation requires the use of the complete description, "denatured alcohol."

Fluidextract of cascara sagrada can be diluted and a clear mixture obtained without the use of alcohol by adding to one ounce of the fluidextract one fluidounce of glycerin and two fluidounces of water.

Ointments that have become granulated, but are not rancid, can be brought back to their original condition by melting and then stirring until cool.

CLINICAL AND CASE REPORTS

(Practitioners and others are invited to contribute to this department reports of unusual and interesting cases which may be helpful to others in the profession.)

SUSPECTED NITRATE OF POTASH POISONING1

By J. A. Webb, London Grove, Pa.

On the 13th of September of last year I was asked by Dr. J. T. Quarll, of Avondale, Chester County, to visit a small herd of grade Guernsey cows. The history of the cases as told by Doctor Quarll and the owner was as follows:

Of the four cows in the herd, three showed almost at the same time, a pronounced hemoglobinuria, accompanied by a marked bloody tinge to the milk. There was a marked loss of appetite, with a resulting decrease in milk flow. One cow died very suddenly after a day's illness, and on post-mortem Doctor Quarll found little to assist him in making a diagnosis of the cause of the condition, except a small, slightly inflamed area of the mucous membrane of the fourth stomach. The kidneys showed evidence of an acute inflammation, and the bladder contained urine of a dark, red color.

When I went to see them, the owner drove the three remaining cows from the pasture to the barn, and as they came toward me they carried their heads up, with ears held at a natural angle, and switched strenuously at the ever-present flies which we have in September. One of them stopped two or three times in an effort to void urine, passing a very small quantity. After being fastened in their stalls, all three showed normal temperatures, with a slightly increased pulse and respiration, which I felt was due to the excitement of being brought from the pasture and the presence of strangers. There was no tenderness over the loins and no swelling or sign of an inflammatory process in the udder, although the sample of milk taken from one was quite pink, due to the hemoglobin in it. On catheterizing the cow which had made several attempts to void urine. I was surprised to find that the bladder contained over a quart of dark, red urine. bladder was partially paralyzed.

Specimens of urine from one cow and milk from another were

¹Presented at the fortieth annual meeting, Pennsylvania State Vet. Med. Assn., Harrisburg, Pa., Jan. 23, 1923.

taken to the laboratories at Philadelphia, on the following day, and no evidence of any organism was found. The symptoms of the cases were then described to Doctors C. J. Marshall and L. A. Klein, and the latter's parting advice was, "See whether they have had access to commercial fertilizers, and especially fertilizers with a high nitrate of potash content."

The following day Dr. Quarrl and I again visited the farm and walked over every pasture, but could find no flower or shrub uncommon to pastures at that season of the year. On returning to the barn, I entered the horse stable, as I had seen two cows pass through the horse stables, and from there to their cow-yard at the time of my first visit. In an empty horse stall, near the heel-post of the partition, were two bags partly filled with fertilizer. One of them had been tramped on recently and torn, but the portion of the contents that had fallen out was evidently not all there. The owner then said that the cows were in the habit of stopping in the horse stable, and particularly in that stall, as salt was sometimes kept in the feed-box, and the cows had the boards licked clean in trying to get a taste of salt. In backing out of the stall, the fertilizer bag had probably been torn and, as the fertilizer was salty in taste, I think that they ate enough of the phosphorus and potash salts to cause the death of one and the symptoms described in two of the remaining three members of the herd. Were we correct in believing this to be the case?

BLACKLEG AGGRESSIN IN SHEEP

By HADLEIGH MARSH

Montana Livestock Sanitary Board, Helena, Mont.

The occurrence of blackleg in two different bands of sheep has been reported by this laboratory.^{1,2} During the fall of 1922 blackleg again caused considerable loss in sheep on the same ranch from which it was reported in 1919.

The history in this case was as follows. The lambs were brought in from the summer range in the latter part of August, and put in the bottom-land meadows at the ranch. There were 250 ram lambs in one field, and in other fields there were ewes, ewe lambs, and wether lambs. Later the ram lambs were split

¹Marsh, H., An outbreak of blackleg in sheep. Journal of American Veterinary Medical Association, V. 9, 1919, No. 3, p. 319.

²Marsh, H., Another case of blackleg in sheep. Journal of American Veterinary Medical Association, V. 15, 1922, No. 2, p. 217.

in two bunches, about half of them being moved to a field on the bench just above the other field. After the bunch on the bench field had been there about six weeks they began to die, one at a time. Up to November 29, between ten and fifteen lambs had died out of the bunch of about 125 in the bench field. There had been no loss in any of the other sheep on the ranch, with the exception of one wether lamb which was lost out of a bunch that had been on this same field earlier in the Fall.

On November 28 the owner expressed a dead lamb to the laboratory for diagnosis. On post-mortem examination we made a diagnosis of blackleg, subject to confirmation from a study of the cultures. On November 29 we vaccinated the 250 ram lambs with blackleg aggressin, using 3-cc doses. At that time we saw only one lamb showing symptoms that might be due to blackleg.

Study of the cultures from the sheep examined at the laboratory confirmed the diagnosis of blackleg. The *Bacillus chauvei* was recovered in pure culture from the heart-blood of a guinea pig inoculated with material from the affected muscle of the sheep.

On February 1, 1923, two months after the sheep sere vaccinated, the owner reported he had had no losses since vaccination. The conclusion would seem to be justified that the aggressin had protected the sheep against the infection, and we consider this experience a valuable field test on the efficacy of blackleg aggressin in protecting sheep against blackleg. This supplements and confirms the results we obtained experimentally on a few sheep, in a test carried out in August, 1920, in cooperation with Dr. Howard Welch, of the Montana Experiment Station.³

MICHIGAN TO KEEP TAB ON HOG CHOLERA VIRUS

The Michigan Bureau of Animal Industry intends to keep a very close tab on the use of hog cholera virus. The following regulation has been issued by State Veterinarian Killham.

"Any person administering the anti-hog cholera serum and virus or simultaneous treatment to any hogs or any person administering the anti-hog cholera serum-alone treatment, to any hogs infected with, or exposed to, a contagious or infectious disease, shall report such treatment to the Department of Agriculture, within five days, indicating in the report the date of treatment, the owner's name, address, county and township, the number of hogs on the farm or premises, the number of sick hogs treated, the number of well hogs treated, the number of hogs that died before treatment, the number of hogs too sick to treat, the number of hogs not treated for other reasons, the amounts of anti-hog cholera serum and hog cholera virus used, and the license and serial numbers of each product."

³Welch, H., and Marsh, H., Vaccination for blackleg in sheep. Journal of the American Veterinary Medical Association, V. 11, 1921, No. 6, p. 715.

AMERICAN VETERINARY MEDICAL ASSOCIATION

Proceedings of Fifty-ninth Annual Meeting, St. Louis, Mo. August 28 to September 1, 1922

(Continued)

LARGE-ANIMAL CLINIC

WEDNESDAY AFTERNOON, AUGUST 30, 1922

(Continued from p. 686, February Journal)

Chairman Kingman: Dr. Kaupp has just one more phase of his program to present.

Dr. Kaupp: Dr. Saunders has arrived, and he will take about ten minutes to demonstrate to you the effects of his toxic *larvae*. Dr. Saunders.

Dr. Saunders: It gives me great pleasure to speak to you fellow scientists and workers in this field, the field of medicine and veterinary science that are now closer together than ever before.

Now, Dr. Eckland, my collaborator, has there a number of animals, some of them killed by what we have named the botulinoid Bengston. The reason we give this title is that Miss Bengston, working under Dr. McCoy, in Washington, isolated the organism from material which I sent to Washington a year ago, and it is a botulinoid organism and yet doesn't exactly correspond to the description of botulinus A or botulinus B.

Moreover, the embryonic green fly is the host of this newly discovered organism. It grows in the embryonic green fly and the mother fly has to feed upon this toxic, virulent material, a "limberneck" chicken for instance, at least three days before the toxic virulent larvae are deposited.

Now, I lost a great deal of time in working on the supposition that all green-fly *larvae* taken out of a "limber-neck" carcass must necessarily have this organism, but they do not.

The other day we went up into the county of St Louis, where a number of geese, chickens and young pigs had died, and expected to get a vast store of these precious *larvae*, and we got thousands upon thousands of them, and not a one of them is toxic or virulent, for the simple reason that we didn't happen to get any *larvae* that had been deposited by a mother fly that had fed upon the material long enough beforehand. I tell you that, so that you may escape disappointment.

Now, the toxin of this organism acts very similarly to the botulinus toxin, only it is not so rapidly fatal; not only that, different animals have a very different susceptibility to it. It takes a great many of these larvae, for instance, to kill an adult fowl. It takes only a fraction, say one or two larvae, to kill a guinea pig, and no guinea pig that is in the least affected by it ever recovers. A great many chickens recover, but where on a farm all the fowls die without a single recovery, it is not this Bengston botulinoid; it is the botulinus, type A.

I have traced up epidemics, and in one epidemic on one or two farms it was a *botulinus*, type A, as Dr. Graham afterwards determined, that not only the *larvae* but the earth in which the larvae were buried all contained *botulinus*, type A, and in this same neighborhood, a few weeks later, I got the typical *Bengston* botulinoid organisms.

Now, this organism is certainly of the *botulinus* family, but it is primarily a parasite or a saprophyte. We know that primarily the type A *botulinus* is a toxicogenic saprophyte, and becomes a parasite only by virtue of its attendant toxin, but we haven't determined yet whether this is primarily a parasite or a saprophyte; probably primarily it is a parasite.

Now this organism is responsible for what I have written about for the last ten years repeatedly under the title of "The Greenfly, or Lucilia, Epizootic."

At the University of Minnesota, three years ago, they followed up these experiments and came to the conclusion that the posterior paralysis of hogs is nothing more nor less than the same disease as "limber-neck" in fowls.

Now, in guinea pigs the paralysis is almost always in the forequarters, but in hogs it is always primarily in the hind-quarters.

Now, where all the hogs die in a night, on a farm, it is not the green-fly epizootic, it is not the *Bengston* botulinoid, it is the type A *botulinus*, but where on the farm the brood sow remains well, but all her pigs die from causes absolutely unexplainable, and if you find there is a lot of "limber-neck" on that farm, you may know that you have then the green-fly epizootic, which is the *Bengston* botulinoid. An adult hog will not succumb to this organism, but the sucking pigs do.

We have now at our station one single survivor of a brood. All the rest died from getting the milk of the mother. She had got infected from eating a "limber-neck" cock. Now, to give you a description of the difference between the effects of this organism and botulinus, type A, a physician told me that he was at his father's, taking lunch, in northern Washington, two or three years ago, and they opened a can of peas. He noticed that the can was swelled, and he said to his mother, "Don't put those peas on the table. They are dangerous." The mother threw them out to the chickens (they had a fine lot of chickens there), and within three hours not a single chicken on the place was alive.

Now, if that had been the *Bengston* botulinoid those chickens would not all have been dead. Some would have been dead and some would have recovered.

Now, we want to inoculate a monkey here. Dr. Eckland will do that.

DR. ECKLAND: Now this monkey that is dead, last night at eight o'clock received an intraspinal injection consisting of one cc of a culture of an organism which we isolated from another monkey that was fed the *larvae* of green flies. He had one cc intraspinally, and he died about ten o'clock this morning of typical paralysis.

The guinea pig had one cc of the same culture in the peritoneal cavity, and the pig that is very sick there will die eventually, probably tonight or tomorrow. He had one cc of a filtrate of this culture, the culture being passed through a filter and the filtrate injected in the pig in the peritoneal cavity.

Dr. Saunders: Now, I would give half the dose. How much did the chicken get?

Dr. Eckland: It had one-half cc and the chicken, as you now can see, is sick.

Dr. Saunders: It takes a vastly larger dose for fowls than it does for guinea pigs.

DR. ECKLAND: The filtered culture will act more slowly. Of course, the straight culture we have here is very rapid in effect.

Dr. Saunders: And it is a gas-producer.

DR. ECKLAND: You will notice how the guinea pig is bloated.

Dr. Saunders: Now, we had a goat to die on Sunday afternoon that received intramuscularly 1 cc in the deltoid muscles, on Friday evening, and within forty hours the animal was dead, and another was injected the same way, with the same syringe, and is still well. He hasn't shown any signs of illness at all. This monkey will get half the dose the dead monkey got, because

we want it to live longer, so that you can study the animal tomorrow.

Dr. Ferguson: How are you administering that?

Dr. Eckland: Intraspinally. The injection is one-half cc. We hope the animal will live until this time tomorrow afternoon, and at that time show the effects of the dose. He will show paralysis, probably of the forequarters.

QUESTION: What is the object of giving it intraspinally?

Dr. Eckland: The organism seems to thrive best in the spinal canal. After the monkey has been killed by feeding it green-fly *larvae*, and cultures taken from the spinal canal, these cultures will produce the organism more rapidly than any of the other cultures.

The organism, as we said, is a bacillus and it is extremely virulent, as you can see from the effects on this animal.

Chairman Kingman: Remember that we are infringing upon another man's time, and we will have to close as soon as possible. (Applause). We have saved the best for the last. Dr. Raffensperger will take up the rest of the time as he sees fit. (Applause).

Dr. H. B. Raffensperger (Bureau of Animal Industry): I have talked around here on worms so long that I feel a little bit wormy myself. Yesterday, when I met the Chief of the Bureau, he said, "Professor." Of course he wanted to say "Professor Worms." I knew what he meant.

I hardly know what I ought to say this afternoon. However, the first thing, I will speak on the clinic that I want to present, and in speaking of that I will be able to present the life cycle of this particular parasite.

I prepared the cultures that I gave to these pigs, by taking the uterus and squeezing out the eggs, and then putting them in a two percent formaldehyde solution. Then I put them in an incubator, at 23-25°C, and if you hold them at that temperature, at the end of three weeks you will get active vermiform embryos inside of the egg shell.

Now one thing is rather peculiar about these eggs. They will not develop at the temperature of the animal body; they must develop at a temperature lower than the animal body. You can take these eggs and put them at a temperature of 37.5°C, and you will get up to about the sixteenth cell division, and then they stop and degenerate, and they will not develop an active embryo inside; if you put them at a temperature of 37°, their growth is entirely inhibited, and if you hold them long enough, they are

destroyed,—you will get no cell division. So these eggs must be developed at a temperature lower than the animal body. You can see that the mudhole and the manure pile are very good places for the development of these parasites.

Now you can feed a large number of these newly-laid eggs in the resting stage to a pig and you will get no infection. Before these eggs are infective, they must contain an active embryo inside the egg shell, so that is what I had when I fed these pigs these eggs.

These egg cultures were made on May 16th, and I fed them on August 22d, so you can figure how long they were held in the two percent formaldehyde solution. We can keep them alive around two years. There have been some investigators who have kept them alive for five years. I couldn't do that, but under certain conditions they can be kept alive for two years.

Now when these embryonated eggs are fed to a pig, they do not develop in the stomach, but they pass into the intestinal tract, then they bore their way out of the egg. Then these free larvae are taken up, probably through the lymph spaces, find their way to the lymph-nodes, make their way into the circulation, and then pass to the liver. Now Dr. Ransom and Miss Cramm have been able to trace them that far; they were able to observe the free larvae in the interlobular vessels of the liver; they were able to observe the larvae midway in the lobule of the liver, between the interlobular and the intralobular vessels; they were able to observe them in large numbers in the right side of the heart, and, of course, we can always find them in the vesicular portion of the lung, as well as in the bronchi and trachea in our infected animals, so you see that the course of migration has been pretty well traced out.

Now, then, as they decrease in numbers in the liver, they will increase in numbers in the lungs, so that again points to the circulation. After they get into the vicinity of the lungs you can see it is simple for them to creep up into the bronchioles and make their way into the trachea.

These pigs have been coughing some, as you notice, and without a doubt we will find in the mucus that has accumulated in the trachea a considerable number of these free *larvae*, and they have made their way from the intestinal tract through the circulation into the lungs, and then after they are swallowed, they will pass into the stomach, and then into the intestine, and there settle down and develop into full-grown ascarids. We have observed that you may sometimes get a very heavy infestation in the lung; you may get a very pronounced case of rapid breathing, and yet if you keep that particular pig a sufficient length of time, you may find only a few round-worms in the intestinal tract. They do pass out with the feces in large numbers, especially where you produce a heavy infestation in that way and they survive, so you can see the reason why we get cases like we have there, where the intestine is almost occluded.

Another thing I want to say is this: no pig has ever passed through a severe case of thumps, that did not get a set-back. Now I didn't infect these very heavily, for a purpose (I didn't want to kill them), or we could have had a very beautiful case of rapid breathing, but where the serious trouble comes in is in the secondary infection. Now when you will observe these lungs, you will find that you will have a considerable edema, and you will have well distributed ecchymotic spots throughout the lungs. As these pigs do not show very severe symptoms, you will probably have a considerable edema, and much of the hemorrhage may have faded out; but withoun a doubt we will be able to demonstrate in the mucus the presence of the free larvae, but where the serious trouble comes in is when you get secondary infection. Now we very frequently get that in our experimental pigs; after the free larvae have passed out, the irritation that has been produced in the lungs will set up a secondary infection, or will prepare the way for secondary infection, and you will get well-distributed small abscesses throughout both lungs. When you get that condition in the pig, you have a serious condition; that pig will never do well, and might as well be knocked in the head.

Now I saw a pig here a little while ago that was brought in from the country. I don't know where it came from, but it was diagnosed as a case of chronic enteritis, but it was thumpting considerably. Now I would almost venture the assertion that I would be able to demonstrate in those lungs the presence of the free larvae. Now I don't want you to understand me, that necrotic enteritis has any connection with Ascaris infection, but I want to say this: where you have conditions sufficiently fifthy that will harbor the presence of parasite eggs, you have conditions sufficiently fifthy that will harbor other microorganisms that affect the pigs, and for that reason when we find lung infection and ascariasis present, we usually find these other conditions

that go with it, such as "bull-nose" and necrotic sore-mouth and nercotic enteritis. I want to stress that where you have conditions sufficiently filthy to harbor these parasites, you have condition sufficiently filthy to harbor these diseases, and so when we started out in our investigational work to ward the eradication of these conditions in the suckling pig, we set up a standard of sanitation that was sufficiently high, one that would do away or would reduce parasitic infection to the minimum, and when we

did that thing, these other conditions disappeared.

Now when I make that statement, I make it based upon facts in field experiments. When we first started our work in McLean County, we had about fifteen farms that cooperated with us, but we went and selected the farms where they were ready to quit the hog business because of the bad luck they had. This is the history I would get: The sows would throw a litter of pigs, splendid, fine-looking pigs, and before weaning time they would dry up and die. That was the thing that would make them become discouraged. They threw up their hands and said they were willing to quit the hog business. We went on those farms with them and worked out a system of raising hogs. The first year we raised only between five and six thousand; last year we raised about seven thousand. This year we have thirty farmers cooperating and we have between eight and nine thousand pigs that we have raised under the so-called "McLean County system" of hog sanitation.

Now if you were to go with me into McLean County, I could take you to these various farms that are cooperating with us, and I would defy you to go among those herds and pick out a case such as you see over here—a rough-haired hog, sunken flanks, or diarrhea, or having the so-called enteritis or "bullnose," and that sort of thing. We have not been troubled with these conditions, and the standard of sanitation we set up is sufficient to control these other conditions.

Now, then, you may wonder why we used the method we do, such as washing the mammae of the sow, and such as scalding out the farrowing pen. We do that because we don't know anything else to do. As I have said to various audiences, I don't know of any antiseptic that will readily destroy the parasite egg. We can incubate them in 70 percent alcoholic solution, or in a 10 percent dichromate of potassium solution, or in a 1-1000 to 1-2000 solution of bichloride of mercury, and the solution we have used is the one I have just spoken about, the two percent formaldehyde solution, so you see antiseptics do not readily affect them, so we had nothing else to do but use hot water, because it will effect their destruction.

Another thing, there is no hope of freezing them. I have taken the parasite eggs and placed them in a freezer at from two to sixteen degrees below zero, for forty days; at the expiration of forty days we defrosted the parasite eggs and put them in a proper culture medium, and they went ahead and developed. You see that cold weather does not affect them. So the only thing we have to depend upon is the hot water; that is the reason we scald out the farrowing pen. The lye doesn't destroy them; we simply use it as a cleanser.

There is some hope probably in phenol and in cresylic acid. I have taken a three percent solution of cresylic acid, and suspended the eggs in it for five hours and effected their destruction, or I have taken a five percent solution of carbolic acid, phenol solution, and suspended the eggs in it for ten hours and effected their destruction; but when you go to spray a pig pen, you can not bring the disinfectant in contact with the egg, so what are you going to do? We had nothing else left to do but simply use the hot water, and we simply cleansed the sow because she is dirty and because on the mammae of the sow there are plenty of Ascaris eggs. She has been around in the dirty old hog lot, and you want to get rid of them, because of the serious condition that the passing of these larvae through the lungs will produce. I want to say right here that the few worms you get in your intestinal tract don't do a very great deal of harm, unless they have invaded the bile duct and produced jaundice or secondary abscesses by their migration.

Just as soon as the pigs are able to suck their mother, we cleanse the mammae of the sow, and after about ten days we take them out into the clean pasture, whether it is January or February, it matters not, and put them in a house where pigs have not been before, and that is all we have to do. Of course, we get the feed and water to them and good results follow. That is a very simple method; the only objection you will find is that it is too much work. If your clients will follow that only half-heartedly, of course they will not get very good results, but if they will go the whole way, I am positive these pig ailments will be largely done away with—those which have been referred to today.

If there are any questions you would like to ask before we kill

the pig and demonstrate the presence of the larvae I would be glad to answer them now.

QUESTION: How do you manage the washing of the sow?

Dr. Raffensperger: We put her in a crate and just use warm water and soap.

QUESTION: If you take a dirty old hog lot and turn it under, how long is it before it is safe to put hogs in again?

Dr. Raffensperger: That is a hard question to answer, but we feel this way: after the hog lot is seeded down to grass, after you have a good stand of grass, it is pretty safe. I am doing some work on that now; I have buried some eggs in my garden at home and I have been looking at them. I will say this: I kept them all winter and when I dug them up this spring they were still alive. I have got four pails that I am going to resurrect some of these days and see what has happened to them during the summer months; but you have a dilution there.

QUESTION: Does whitewash kill the eggs?

Dr. Raffensperger: No, sir.

QUESTION: What is the temperature of your water?

Dr. Raffensperger: Eighty degrees centigrade, if the individual egg is exposed, but we just use boiling water, and plenty of it.

QUESTION: How do you handle the creeks and the branches in the pastures where the hogs go and make wallowing holes?

Dr. Raffensperger: We have not paid so much attention to that. The eggs will gravitate to the bottom and it would have to be a very small stream and would have to be used a great deal to be very much contaminated.

QUESTION: What effect does oil have on the eggs—crude oil medicated with cresylic acid?

Dr. Raffensperger: I have never tried that; I have tried the cresylic acid, but not the combination.

Dr. Raffensperger: Now, gentlemen, there is something to this, and if you don't believe it, just come over to McLean County and see for yourself. Allen Brown's farm has 2300 pigs this year, and he has been visited by men not only from Illinois, but from Iowa, and I asked a bunch that visited those farms just two weeks ago to pick out a runt, and they couldn't do it; the pigs haven't been picked, they are there just as they came.

ADJOURNMENT.

(To be continued.)

OTHER MEETINGS

VETERINARY MEDICAL ASSOCIATION OF NEW YORK CITY

The regular monthly meeting of the Veterinary Medical Association of New York City was called to order by the President, Dr. J. Elliott Crawford, in the Academy of Medicine, 17 West 43rd St., on Wednesday evening, Jan. 3rd, at 8:45 p. m.

The minutes of the December meeting were read and approved. The President, in a well-composed address, expressed his appreciation of the honor of being unanimously elected President of this Association, and of his willingness to discharge the duties of the chair, in an impartial manner, and with courtesy and consideration to all.

He called attention to the weaknesses of the Association, in that we have about 75 dues-paying members, out of about 300 eligible veterinarians, within the radius of our Association. Also, that the number of new members added each year is being offset by the number of old members loosing interest and failing to pay their dues. As a remedy for this condition he asks each member to put his shoulder to the wheel, eliminate all obstacles and develop a unity capable of attaining our objective, of having every worthy veterinarian in our territory a member of this Association.

Dr. Crawford referred to the accomplishments of this Association in the past, but added that more is demanded of it in the future, in shaping the course and leading the way to our progress. This can be done only by a stronger organization, working with a united thought. The stronger we become individually and collectively, the greater good we can accomplish. He asked the members to express their views more freely on the subjects discussed, and to aid the program committee in their work of preparing entertainment. The president closed his address by wishing all the members a prosperous and happy New Yoar.

Dr. William J. Lentz, of the University of Pennsylvania, addressed the meeting and gave a most instructive and interesting talk on various diseases of the dog. The doctor has had a wide experience, and while he could not cover many diseases, he did give us food for thought in handling some diseases.

He spoke of the Bacillus bronchisepticus, but stated that it

was almost impossible to create the disease with this organism, and that the bacteriologists have not yet gone far enough in research work with dog diseases. The speaker referred to distemper as too broad a term, and in a way divided the desease into three forms, outlining the symptoms of each, and the line of treatment, both dietetic and medicinal, that he had found most satisfactory in dealing with the several forms.

Dr. Lentz referred to trypan blue, a German preparation, as of no value, after a series of experiments. He referred to serums and vaccines as of practically no value.

The next subject discussed was "Helminthiasis." Carbon tetrachloride was indicated for hookworms, but in some old cases, chenopodium 15 min. and chloroform 2 min., to 1 oz. castor oil, was found to be more valuable. In tapeworm treatment, arecoline hydrobromide \(^1\frac{1}{4}\) gr. was found satisfactory. Santonin \(^1\frac{1}{2}\) gr. and calomel \(^1\frac{1}{4}\) gr. were indicated for whipworms.

Dr. Lentz gave a very interesting talk and outlined a simple technic for performing cesarean operations, but did not advise such an operation where we have a high temperature, with any indication of a septic condition.

Dr. Robert S. MacKellar called the attention of the Association to the Conference of Veterinarians, to be held at Ithaca, N. Y., Jan. 11-12, and the President urged all members to attend if possible.

Dr. George Watson Little and Dr. Louis A. Corwin were unanimously elected to membership.

The President named the following committees for the year: Program: Drs. Roy W. Gannett, Chairman; Bruce Blair, Alex. Slawson. Legislative: Drs. W. Reid Blair, Chairman; Robt. S. MacKellar, Wm. H. Hayes. Prosecuting: Drs. Jos. Mulcahy, Chairman; Jacob H. Cohen, O. R. Scheuler, E. I. Altman, Thos. E. Booth.

It was regularly moved and seconded that a rising vote of thanks be extended Dr. Lentz, for his most interesting and honest talk.

No further business appearing, the meeting adjourned.

FEBRUARY MEETING, 1923

The regular monthly meeting of the Veterinary Medical Association of New York City was called to order by the President, Dr. J. Elliott Crawford, in the Academy of Medicine, 17 West 43rd St., on Wednesday evening, Feb. 7th, at 8:45 p. m. Fifty members and visitors were present.

The minutes of the January meeting were read and approved. Dr. H. J. Milks, of Cornell University, Ithaca, N. Y., gave a most interesting and instructive talk on diseases of the dog. He first spoke on skin diseases, classing them as parasitic and non-parasitic. The non-parasitic he divided into acute and chronic, dry and moist, outlining treatment for each kind. The parasitic skin diseases discussed were ringworm and the various forms of mange. Dr. Milks referred to ear-mange as a rather common disease of both cats and rabbits. He briefly touched upon the various intestinal parasites, and gave appropriate treatment for each.

Dr. Frank H. Miller was the next speaker of the evening and gave a great many valuable suggestions in handling the various diseases of the dog. He spoke of the biologics used in the treatment of distemper as of some value, in his opinion, and cited a number of peculiar cases of this disease, especially in police dogs, where in 24 hours they would develop a quick pneumonia and die. On autopsy these cases would show the pneumonic areas and a pronounced edema of the lungs. He stated that this disease has been causing a great hardship upon dog owners, and something should be done to prevent the importation and exportation of dogs suffering with distemper.

Dr. Miller then referred to various skin diseases, touching upon difficulties met in successfully treating follicular mange. He cited one case of this disease in a horse. He cited several cases of mange in cats, where the disease had been transmitted to the owners. He called attention to the need for publicity in the matter of vaccination against rabies. Discussion on this subject was postponed until the next meeting.

Dr. W. Reid Blair was the next speaker called upon, but owing to the lateness of the hour his remarks were brief. Dr. Blair called attention to the importance of the microscope in the diagnosis and treatment of skin diseases of small animals.

Dr. Charles V. Noback of Columbia, South America, displayed maps and discussed the veterinary situation in that country, but owing to the late hour discussion was postponed until the March meeting.

It was regularly moved and seconded that a vote of thanks be extended to Drs. Milks, Miller, Blair and Noback for their valuable and instructive discussions.

Dr. E. L. Sanford, Glen Cove, L. I., was unanimously elected a member of the Association.

No further business appearing, the meeting adjourned.

C. G. ROHRER, Secretary.

B. A. I. VETERINARY INSPECTORS' ASSOCIATION OF CHICAGO

The following is a report of the meetings held during the past month by the school of instructions for the veterinary inspectors as instituted by Dr. W. N. Neil, Inspector in Charge of the Chicago Station, which meets in the Government Office of one of the local plants each Monday morning. The Chicago Branch of the National Association of Bureau of Animal Industry Veterinarians prepares a program for several weeks in advance, on various subjects relating to meat inspection. All subjects are presented by inspectors who have had considerable experience in the Bureau. Various pathological specimens of interest, as well as rare conditions found by the inspectors, are collected during the week and held under refrigeration until the following Monday morning, when diagnoses and discussions are made.

On January 8, 1923, Dr. L. E. Day, gave a very interesting and instructive talk on "The Histology and Post-mortem Changes of the Skeletal Muscles."

On January 15, 1923, Dr. W. H. Daly, President of the Local Association, presided at the meeting. Dr. G. W. Knorr read a paper on "Ante-mortem and Its Relation to Post-mortem Inspection."

On January 22, 1923, Dr. L. E. Day, gave a talk on "The Adipose Tissue of Various Animals." Dr. Day's talk covered the composition and various physiological and pathological changes of adipose tissue.

On January 29, 1923, Dr. W. N. Neil, Inspector in Charge of Meat Inspection at the Chicago Station, gave a very instructive talk on "Packing-House Sanitation."

On February 5, 1923, Dr. L. E. Day, gave a talk on "Malformations, Dissolution of Continuity, Atrophy and Hypertrophy." Dr. L. A. Merillat was a welcome visitor, and he addressed the meeting on the subjects of "Professional Veterinarians" and "The Officers' Reserve Corps."

On February 12, 1923, we had an open meeting for the discussion of the activities of the Association, and Dr. R. C. Livers

talked on the subject of "The Lymphatic System and Its Relation to Post-mortem Inspection." Lieutenant-Colonel W. P. Hill, of the Sixth Area Depot, was a visitor at this meeting, and Dr. W. N. Neil extended to Colonel Hill and all of his associates a warm welcome to all of our meetings.

L. T. Hopkins, Secretary.

KENTUCKY VETERINARY MEDICAL ASSOCIATION

The winter meeting of the Kentucky Veterinary Medical Association was held at Louisville, Ky., Feb. 7 and 8, 1923.

The meeting was called to order by Dr. J. K. Ditto, of Pleasureville. In welcoming the Association to Louisville, Dr. Calldemeier extended an everlasting welcome to the members and extended an invitation to make Miller and Calldemeier's Hospital our headquarters when in Louisville. Dr. D. E. Westmoreland responded in his usual witty manner, including a few stories that were timely and well chosen. Dr. Ditto thanked the Association for the honor that had been bestowed upon him by the members in electing him to the highest office, at the Owensboro meeting, and gave fair warning that he would continue to be a live wire in the organization.

Dr. Robert Green, with the U.S.B.A.I. force on hog cholera work in the mountains of Kentucky, read a very interesting paper on "Hog Cholera and Sanitation." His paper was thoroughly discussed by Dr. W. W. Dimock, of the University of Kentucky, whose discussions brought some very interesting information to light. Dr. Wm. Coffee, of La Center, and Dr. J. K. Beyer, of Henderson, discussed the paper from the view-point of the practitioner, which proved very interesting.

Dr. W. H. Simmons, State Veterinarian, spoke on "Progress of Tuberculosis Eradication Work in Kentucky." He advised the practitioners that the accredited herd work was being turned over to them immediately upon completion of their accreditation. He also outlined the manner of making appraisals. A general discussion followed, in which many points of interest concerning the work were brought out.

In the absence fo Dr. W. F. Biles, Inspector-in-charge of the U.S.B.A.I. force in Kentucky, Dr. Allen Barnes, Assistant to Dr. Biles, discussed the ophthalmic and intradermal tests.

Dr. E. A. Caslick, Assistant Veterinarian, Kentucky Agricultural Experiment Station, read a very interesting paper on "Fil-

aria in the Ligamentum Nuchae of the Horse." A general discussion followed.

Dr. C. H. Palmer, of Shelbyville, spoke at some length on "Results of Treatment of Abortion and Sterility in Cattle." This being a subject of very great interest, his paper was thoroughly enjoyed. He gave the Association the benefit of the results of all his work in a very concise manner. Dr. H. Gieskemeyer, of Ft. Thomas, and Dr. J. J. Kay, of Frankfort, also supplied the members with some very valuable data during their discussion of the paper.

Dr. J. F. Shigley, of St. Paul, Minn., read one of the most interesting papers ever read before this Association, and one that created quite a little comment. His subject was "Glandular Therapy." Dr. E. Calldemeier, of Louisville, read a paper on "Eversion of the Uterus in the Cow", in which he outlined the technic of replacing the organ and the after-treatment. Dr. David Smith's paper on "A Veterinary Psycho-analysis" struck a responsive chord. His remarks were timely and to the point, with the original wit of Dr. Smith thrown in.

A business session followed, and the following were chosen as officers for 1923. Dr. H. Gieskemeyer, Newport, President; Dr. A. O. Longnecker, Hickman, 1st Vice-President; Dr. Geo. W. Pedigo, Glasgow, 2nd Vice-President; Dr. E. C. Higdon, Madisonville, 3rd Vice-President; Dr. J. A. Winkler was again chosen to serve as Secretary and Treasurer.

The second day was spent at the hospital of Drs. Miller and Calldemeier. Those who had not had the privilege of visiting this hospital prior to the meeting were struck with awe at the largeness and the completeness of the institution. Without a doubt their hospital is the most complete veterinary institution in the South.

Dr. W. B. Craig, Dean of the Indiana Veterinary College, addressed the Association along the lines of general veterinary interest. His paper was on "Some Fundamental Principles of Surgery." He included all phases of the work, such as restraint, operative procedure, etc. His discussion of the veterinary situation as it exists today was indeed interesting to all.

The Association then turned their attention to the clinics. Dr. W. B. Craig performed several operations on dogs, including ovariectomy. He also performed the "nicking" operation on several horses. His work was thoroughly enjoyed and his ability to lecture while operating was commented upon. Dr. J. W. Jame-

son, of Paris, also "set" several tails with the "nicking" operation. He also performed oophorectomy on two heifers. Dr. Jameson is getting along in years, but his ability as a surgeon has never been questioned.

Dr. D. Smith, of Shepardsville, performed the "button hook" method of spaying a bitch. Dr. C. N. Finch, of Jeffersonville, Ind., having just returned from Cuba, where he performed quite a few roaring operations on racers, arrived at the meeting in time to demonstrate the operation. The Association is always pleased to have Dr. Finch visit them as they enjoy seeing him operate.

We were then invited to partake of a buffet luncheon, served by Mrs. Calldemeier, Mrs. Miller and Mrs. Westmoreland, at the Hospital. Everyone thoroughly enjoyed the "eats". We were entertained during luncheon by the famous Louisville Jug Band of colored musicians. A vote of thanks was tendered the wives of the doctors who so kindly arranged the luncheon. A vote of thanks was also tendered Drs. W. B. Craig and C. N. Finch for their coming to the meeting. They both stated that the social features of the Kentucky meetings were surpassed by none. Both were invited to attend our summer meeting, which is to be held at Lebanon, Ky., on July 11th and 12th. This brought one of the most largely attended and most interesting winter meetings to a close.

J. A. WINKLER, Secretary-Treasurer.

MISSOURI VALLEY VETERINARY ASSOCIATION

The twenty-ninth mid-year meeting of the Missouri Valley Veterinary Association, held in St. Joseph, Mo., February 13-14-15, 1923, proved to be one of the best veterinary conventions held in the central West this season, and was considered by many old members one of the most successful meetings in the history of the Association. An attendance of approximately three hundred veterinarians who stayed until late into the last afternoon, taking in the splendid clinics, showed that the Association still holds the interest of the Missouri Valley veterinarians, in spite of the strong state meetings in the Missouri Valley, and regardless of legal difficulties.

Dr. H. B. Treman, of Rockwell City, Iowa, President of the Association, kept things moving all the time in his usual active style. Good discussions and an interest in the topics, followed each paper. The Secretary, Dr. R. F. Bourne, was taken sick enroute to the meeting, suffering from a hemorrhage of the stomach.

He may have to undergo an operation at the Mayo Hospital. His pleasant and helpful assistance at the meeting was indeed missed. Dr. Treman appointed Dr. E. R. Steel to act as Secretary during the convention.

An unusual procedure adopted by this Association proved to be highly successful. Due to the annoyance caused at former meetings, by some of the veterinarians lingering in the instrumentdisplay rooms, the instrument people were requested to close shop during the programs. This they were very glad to do, for

these men, themselves, wished to take in the program.

Another feature of the meeting was the manner of handling the clinic. Papers were read or talks made, and immediately following demonstrations were conducted. The large and comfortable amphitheater of the St. Joseph Veterinary College was greatly appreciated. The entertainment by the local committee, too, was certainly exceptionally fine. Several veterinary motion pictures were shown at night, and a dance given by the students was well attended. Community singing and solos by veterinarians also were attractions of the nocturnal proceedings.

The program included live topics by practitioners, papers and demonstrations from veterinarians with some of the Missouri Valley State Veterinary Colleges, and exhibits and discussions of pathological specimens by the B. A. I. veterinarians. Members who missed this meeting missed a very instructive, highly entertaining, and perfectly harmonious gathering of Missouri Valley veterinarians.

E. R. Steel, Acting Secretary.

ALABAMA VETERINARY MEDICAL ASSOCIATION

The sixteenth annual meeting of the Alabama Veterinary Medical Association was called to order on the night of February 22, 1923, by the President, Dr. D. J. Meador. The meeting was held in one of the new Veterinary Buildings, of the College of Veterinary Medicine, of the Alabama Polytechnic Institute at Auburn. Dr. D. J. Meador delivered the President's address, in which he advised the veterinarians to enter into closer cooperation; support the State and Federal veterinary work, and also look after municipal and local interests of the veterinary profession. The key-note of his address was that veterinarians must organize and cooperate in order to obtain and maintain their rights in practice, in inspection work, and along all other lines.

In the absence of the writer, Dr. G. W. Browning, of Mobile, Ala., his paper, "Have Faith in Your Drugs," was read by the Secretary. This brought out some vigorous discussion, because the paper stated that a great deal depends on placing dependence in your drugs, and not so much attention should be paid to the new fads of bacterins, vaccines, etc. The next paper was read by Dr. J. H. Staples, on "Intestinal Parasites of Dogs." This was a well-written paper, giving the different classes of parasites, and enumerating and describing nearly all the species of intestinal parasites. In conclusion, he gave the common modes of treatment.

The next paper was read by Dr. L. K. Ogletree, of Enterprise, on "Fright Disease in Dogs." This brought out an extended discussion, especially covering the ground of causes and treatment. There were a number of suggestive causes, none of which were proven to be the real or combined cause of the disease. Among them were: a type of distemper, the toxic and irritating effects of intestinal worms, parasites in the nasal passages and sinuses of the head, constipation, botulinus poisoning, etc. As to treatment, there was nothing developed that was uniformly successful in its application. Also, it was the opinion that no type of dog was immune to this disease.

A general discussion on infectious abortion in cattle was led by Dr. W. B. Fleming. This discussion was confined largely to methods of handling the disease in a herd of cattle. It finally narrowed itself down to isolation, cleanliness of vulva, vagina and external parts; never breeding until the lochia had ceased; never adding any new female animals to the herd, except unbred heifers; regular and careful disinfection of the barns, etc.

The next thing in order was the post mortem, in the city and college slaughter house, on a grade Holstein heifer and calf. The cow had been made a suspect and held over a period of 60 days before the second test. She did not react to the intradermal and ophthalmic tests, and no lesions were found on post-mortem examination.

Dr. J. S. Andrade, of Huntsville, read a paper on rabies, covering largely the symptoms, causes and prevention. Dr. J. L. Orr then delivered a technical paper on toxin and antitoxin. He gave a list of disease-producing germs that produce toxins, the methods of producing antitoxins and their application and uses in the various diseases in which they are found.

Dr. R. S. Sugg, bacteriologist in the Veterinary College, gave

an interesting talk on the methods of preparing specimens to be sent to the laboratory for examination. He divided the specimens in four classes; (1) bacteriological, (2) parasitic, (3) pathological, and (4) chemical. In other words, specimens sent to the laboratory are usually for one of these four kinds of examinations, and should be prepared specifically for a definite purpose.

Vaccines and bacterins were carefully discussed in a paper by Dr. J. W. Berry. His subject was somewhat technical and led to some discussion.

Dr. H. C. Wilson, Federal hog cholera specialist in Alabama, gave a talk on the present status of hog diseases in Alabama. He covered the subject of hog cholera, skin diseases, parasites, etc. He discussed the uses and abuses of hog cholera serum and virus. "Methods of Administering Drugs to Swine," was covered in detail by Dr. W. B. Castleberry. The various kinds of medicine and the modes of administration to the hog were described in full. How to handle hogs before and after giving the double treatment was described by Dr. W. B. Staples.

The next paper was read by Dr. I. S. McAdory, on "Handling and Care of Hospital Cases." He went into details as to the care of different kinds of hospital animals, stating that it was very essential that the animals in the hospital receive the best of attention and care in order to get the best results from surgical operations and internal diseases. The next paper was read by a Cuban, C. Cuadras, on tuberculin-testing of chickens. He described the intradermal test and the method of using it in chickens, and stated that the ophthalmic and subcutaneous methods were not applicable to poultry.

One of the most enjoyable features of the meeting was a banquet given by the students' Veterinary Medical Association. This banquet was spread in one of the new buildings of the Veterinary Medical College, and was attended by a hundred or more, at which the flow of reason, as well as the physical feast, was most heartily enjoyed by all who attended. The newly elected officers of the Association are; Dr. L. K. Ogletree, of Enterprise, President; Dr. W. S. Seibold, Gunterville, Ala., Vice-President; Dr. C. A. Cary, Auburn, Ala., Secretary-Treasurer.

On the morning of February 24th, the Federal and State authorities gave an examination to the senior students and the veterinarians. It Covered the requirements for testing accredited herds. This was taken by about twenty persons. Also, on the morning of the 24th, there was a poly-clinic given at the surgical

and clinical departments. Among the cases operated on, and examined and diagnosed were: (1) an abscess of the shoulder; (2) strangles abscess in the posterior pharyngeal region; (3) strangulated hernia in a mule colt, in which the stitches were to be removed after a perfect cure had been made; (4) fistulous tract from deep abscess in the right ramus of the lower jaw of a mare. This was a sequel of the repulsion of a tooth at a previous period. There were a number of minor cases, such as spaying, that were handled at the clinic.

Dr. N. G. Covington gave a thorough demonstration of a post mortem on a mule. This involved every step, in which every part of the body of the mule was exposed for post mortem, or for naked-eye examination of pathological changes. It was the most complete autopsy ever witnessed by the veterinarians present. Dr. F. B. Paterson then gave demonstrations on methods of handling post mortems on chickens. This was a thorough and complete post mortem, showing all parts of the various organs, and division of the body in order that pathological changes might be observed by the naked eye. Since poultry-raising is coming into its own, it is extremely important that the practitioners cover every detail of autopsy work.

The committee on resolutions, reported the following resolutions for adoption:

1. We hereby take this occasion to extend our sincere thanks and commendations to President Spright Dowell and the Board of Trustees, of the A. P. I., for the new buildings and equipment, and support of the College of Veterinary Medicine, of the A. P. I., and suggest that the College be further supported by other necessary buildings and equipment.

2. That no graduate or licensed veterinarian shall be permitted to accept the position of County Veterinarian, or County Demonstration Agent, or both, in the State of Alabama.

3. It is the concensus of opinion of the Alabama Veterinary Medical Association, in convention at Auburn, Alabama, February 23, 1923, that all meat and milk inspectors shall have a veterinary medical license from the Board of Veterinary Medical Examiners of the State of Alabama, and that all meat and milk inspection in Alabama should be under the supervision of licensed veterinarians.

C. A. CARY, Secretary.

THE NORTHWESTERN OHIO VETERINARY MEDICAL ASSOCIATION

The sixteenth annual meeting of the Northwestern Ohio Veterinary Medical Association was held in the Hotel Waldorf, Toledo, Ohio, on Wednesday, February 28, 1923, President C. E. Inskeep presiding. The meeting was called to order at 11:45 a. m. The Treasurer's report was read and accepted.

Four new members were added to our list, making a total membership of 115.

The following officers were elected for the ensuing year: President, Dr. H. E. Ash, Bowling Green; Vice-President, Dr. W. F. Wise, Medina; Secretary-Treasurer, Dr. C. A. Fast, Van Wert. Dr. F. A. Lambert moved that a vote of thanks be extended to the retiring officers for their devotion to the interests of the Association, which motion was unanimously carried. It was decided that the next meeting be held at Russels Point. No definite time was specified, but it would be sometime in August. Immediately following the business session, a banquet at the Waldorf was enjoyed by all.

The afternoon session was opened by Dr. E. W. Porter, Assistant Pathologist, at the State Serum Plant, Reynoldsburg, Ohio. It was felt that his talk and charts alone were worth more than the business missed at home. The discussion was led by Dr. C. W. Fogle The second number on the program was an excellent paper, entitled "The Relation of the Field Veterinarian to the Practitioner," by Dr. Leo E. Davis, who is in charge of cooperative work for the B. A. I. Dr. Reuben N. Hilty led the discussion on this paper. The next paper, "The Practical Value of Poultry Vaccines," by Dr. E. D. Ensign, of Bryan, was brief but to the point. It was followed by very free discussion. Dr. G. L. Freeze gave a splendid talk on "Everyday Diseases of Dogs," which aroused a very general discussion.

We were honored with the presence of some Michigan visitors, among them being Drs. A. L. Tiffany, of Monroe, H. T. Carpenter, of Detroit, and H. Preston Hoskins, Secretary-Editor of the A. V. M. A., of Detroit. These men were not wall-flowers either, because they took an active part in the discussions. Dr. Carpenter, as President of the Southeastern Michigan Veterinary Medical Association, invited his Ohio neighbors to the next meeting which will be held in Detroit, April 11th. Dr. Hoskins gave the final address of the meeting. His talk was in behalf of the A. V. M. A., and he was able to give some advance information concerning the Montreal meeting. He concluded his remarks with an invitation for all veterinarians to attend the Montreal meeting and enjoy themselves in a way that was impossible in the States.

CHARLES A. FAST, Secretary.

VETERINARY CONFERENCE AT THE UNIVERSITY OF PENNSYLVANIA

The annual Veterinary Conference at the University of Pennsylvania, held on February 27th and 28th, was very successful and well attended. Over 150 veterinarians registered mostly from Pennsylvania, but many from adjoining states (N. J., N. Y., Del., Md., R. I.)

"Demonstration of the Regional Anatomy of the Chicken," by Drs. W. J. Lentz and E. T. Booth, was the first subject of the opening session. The title is misleading because in the dozen or more birds dissected one learned, besides the anatomy, much of the physiology of ovulation, digestion and respiration. The discussion of the specimens of Dr. Lentz was very instructive and paved the way for the presentation of the papers following.

Dr. Fred Boerner, Jr., of the Pennsylvania Bureau of Animal Industry, spoke on "Chicken Pox and Related Diseases." His remarks were illustrated by lantern slides from which the differential diagnosis was made clear. His experience with vaccines in chicken pox on 2197 cases and 3274 controls led him to conclude that vaccines were useless.

In discussing this paper Dr. A. D. Goldhaft, of Vineland, N. J., said chicken pox is not feared by poultry husbandmen when pullets are on range, because then the mortality is low, and that some introduce the disease at that time so that an immunity may be acquired which will protect them when housed and laying. He also said, in speaking of bacillary white diarrhoea, that many flocks in New England were advertised as "accredited-free" from the disease; that their eggs for hatching and birds are safe to introduce into other flocks.

Dr. E. L. Stubbs, of the Pennsylvania Bureau of Animal Industry, spoke on Avian Tuberculosis. He said the abdominal lesions predominate in the following order: first the liver, then the spleen and lastly the intestines. The diagnosis is made by autopsy on individuals and by the intradermal test of flocks. Dr. Stubbs had a demonstration showing several birds with a pronounced reaction to the test. The injection is made in the wattle.

In the afternoon, Dr. F. S. Jones, of the Department of Animal Pathology, Rockefeller Institute for Medical Research, presented "Pneumonia in a Dairy Herd Attributed to Bacillus Bovisepticus." In this outbreak, Dr. Jones pointed out that

post mortem he found the spleen and kidneys sterile, but the organisms were found in the lungs, from which he concluded that all pneumonias of cattle are not hemorrhagic septicemia as is usually thought. The paper was well discussed by Dr. Joseph Johnson, of Lancaster, Pa., and others. As usual, the value of vaccines in hemorrhagic septicemia was debated. Dr. Johnson said he had used vaccines in 2000 cases and believed them beneficial.

Following this paper, Dr. Ralph B. Little, a colleague of Dr. Jones, delivered a paper on "The Significance of Colostrum to the New-born Calf, Cow Serum as a Substitute, and Absorption of B. Abortus Agglutinins from Colostrum and Cow Serum." This was a review of three papers on closely related subjects. It was accompanied by lantern slides from his experiments, from which Dr. Little deducted that colostrum contains agglutinins and that the lack of colostrum causes intestinal bacteria to become pathogenic during the early days that are harmless later on. These protective agents are also present in the cow serum which if given per os or intravenously replaces the colostrum. The new-born calf, given these protective properties soon after birth, thrives better than one deprived of them.

Dr. Hugh F. Dailey, Chief Veterinarian, Angell Memorial Animal Hospital, of Boston, Mass., gave an interesting paper on "Coli-Bacillosis of the Cat." This disease, which too frequently affects cats entered in hospitals for minor ailments or operations, is not an infectious disease primarily, but an intestinal stasis progressing to a toxemia, according to Dr. Dailey. If taken early it is not to be feared. Prevention is important. This consists of an enema of normal salt solution to empty the rectum (it also causes urination in most cases). Following this two drams of castor oil is given. He cautioned against carrying or handling the patient after administering castor oil, as vomition is often produced by so doing. Should this occur, repeat until it is retained.

In the evening, Dr. Allen J. Smith, of the Medical School, University of Pennsylvania, gave an interesting talk on "Inflammation as a Defensive Reaction," in his usual interesting and impressive style. Although an old subject, and Dr. Smith said he had nothing new to offer, so attentive was the big audience throughout the hour that one could have heard a pin drop at any time.

On Wednesday morning, the session was opened by Dr. Edw.

- A. Cahill, Director, Pitman-Moore Laboratories, with a comprehensive survey of "The Diseases of Swine." With the limited time at his disposal, Dr. Cahill touched upon all the important diseases of swine in a remarkably able manner. I will summarize here only a few of the points he brought out.
 - 1. Hog cholera is the most serious disease of swine.
 - 2. Hog cholera vaccination is as valuable as ever.
- 3. Hog cholera should always be suspected unless previously protected.
- 4. Baby-pig vaccination should be avoided or followed up later.
- 5. Other diseases are widespread and serious and the lesions found in hog cholera are frequently found in them.
 - 6. Healthy swine harbor pulmonary infectious germs.
- 7. The profession is negligent in not making accurate diagnosis.
- 8. Parasitic diseases are increasing. They devitalize the system and predispose to other maladies.
- 9. "Flu" as an entity is disputed; it is probably a form of hemorrhagic septicemia. Mortality 2-3%. Loss in weight is the worst factor.
- 10. Swine erysipelas does exist in the Western States although it is generally believed that the U.S. is free from it.
- 11. Hog cholera travels in cycles of 7 years. This is true in hemorrhagic septicemia and necrotic enteritis, but not so well defined.
- Dr. B. H. Ransom, Chief, Zoology Division, U. S. Bureau of Animal Industry, with the aid of lantern slides, gave an interesting talk on "Ascaris in Swine." This is a much neglected but highly important phase of swine husbandry. Dr. Ransom showed how eggs pass through the intestinal walls to the liver, heart and lungs, in from 18 to 24 hours after ingestion. The old belief that the rat was a necessary intermediate host was clearly disproven. The new-born pig is most susceptible and a tremendous loss through death and stunted growth is sustained throughout the country, from this parasite alone. In explaining how resistant the eggs of this worm are, Dr. Ransom stated that they grow them in the laboratory in 2% formalin solution. For prevention, the following rules should be observed:

- 1. Have clean farrowing pens.
- 2. Clean sow-dirt washed off.
- 3. Move within two weeks to clean pasture.
- 4. Keep pigs on pasture for four months.
- 5. Proper food, water and shelter from sun and rain.

In the afternoon, we were entertained by the Provost of the University, Dr. Josiah H. Penniman. Owing to unavoidable circumstances he was unable to deliver his address earlier, but made up for the delay by the sincerity of his welcome. Dr. Penniman pointed out the serious situation of veterinary education at the present time, the decrease in schools and enrollment. "Since the health and well-being of a community rests so largely in the hands of veterinarinas, the University of Pennsylvania is proud of having a school training men along these lines." He suggested going to the high schools and getting young men thinking about the source of their food and clothing, about milk and meat hygiene, and of the need for veterinarians to protect these resources, a work worthy of their best intelligence and effort.

Dr. H. C. Crawford, of Jamaica, L. I., presented a comprehensive paper on "Some Ailments Peculiar to the Thoroughbred and Hunter." His subject was large and ably handled. Although the diseases mentioned were familiar to veterinarians, it was very interesting to have pointed out to us how peculiarly susceptible these two types of horses are to the ailments affecting especially the extremities. The paper was fully discussed by Dr. Adams in his usual interesting manner.

The final paper of the program was a "Discussion of the Factors Concerned in the Etiology of Equine Influenza and Contagious Pneumonia," by Captain R. A. Kelser, Veterinary Corps, U. S. Army. Dr. Kelser has had considerable experience as a laboratory man and in the field during and since the late war. He said that there was nothing new known about the specific etiological factors responsible for these two diseases. He strongly emphasized the predisposing causes and the prime importance of eliminating them insofar as possible. This is paramount even if deeper research reveals more clearly the identity of the specific causative agents. Data collected by the War Department was cited, by which he showed how the incidence of these two diseases had been stupendously reduced through the exercise of vigilant supervision and enforcement of sanitary police measures.

Although Capt. Kelser confined his remarks to the two diseases mentioned, one could not help but feel that such measures might with equal propriety be directed against a large number of our epizootics instead of relying entirely upon some biological agent, a method which is unfair both to the patients and to the biological product.

V. G. KIMBALL, Recorder.

ARIZONA VETERINARY MEDICAL ASSOCIATION

The regular annual meeting of the Arizona Veterinary Medical Association was held at Glendale, Ariz., February 24, 1923. The meeting convened at the hospital of Dr. Emmett Otto, and was very well attended. The extensive program included a surgical clinic in the afternoon. Among the subjects discussed were "Tuberculosis Eradication," by Dr. M. Shipley; "Veterinary Legislation," by Dr. Dotty; "Forage Poisoning in Horses," by Dr. C. H. Newton; "Some Experiences of a State Veterinarian," by Dr. R. J. Hight; "Experiences of a Veterinarian at Port of Entry," by Capt. D. B. Leininger; and a number of others. The clinical part of the program included "Animal Restraint," by Dr. Emmett Otto; "Fistula Operation," by Dr. S. E. Douglas; "Veterinary Dentistry," by Dr. H. E. Gerdes; and "Lameness of Horses," by Dr. Z. S. McNees.

Before the invention of the microscope the mite was the smallest known animal. It had a volume less than a cubic millimeter. It is now proved that a cubic millimeter of rottenstone is composed of more than 2,000,000 shells of fossil animals. One drop of pure water may contain about 150,000,000,000 infusoria.—Science.

First Artist: "I painted up a lump of pig-iron once to look like cork, and when I threw it into the water it floated."

Second Artist: "That's nothing! I painted a lump of pigiron to look like a roast of beef, and my dog ate three-quarters of it before he discovered his mistake."—Boston Transcript.

One of the questions in an examination on the subject of stock-raising was, "Name four different kinds of sheep."

An aspiring youth gave this for the answer, "Black sheep, white sheep, Mary's little lamb, and the hydraulic ram."—

Eastern Oracle.

COMMUNICATIONS

CONCERNING REVISION OF CONSTITUTION

TO THE EDITOR:

The first recommendation contained in paragraph five of the Report of the Special Committee on Closer Affiliation with State and Provincial Associations (Journ. A.V.M.A., Oct. 1922, p. 100) reads as follows: "Therefore we recommend that a special committee, consisting of the President of the Association and four other members, be immediately appointed to study the details of the plans herewith submitted, in conjunction with the Executive Board, and that this report shall be considered as a written notice to the Association of a proposed revision of the Constitution and By-Laws at the next annual meeting."

The Report was adopted and the recommendation quoted above automatically became in force. In view of this fact and that the Special Committee is doubtless proceeding now on that basis, it is important that the attention of the members of the Association be drawn to two facts in connection therewith.

- (1) What were "the plans herewith submitted?" There is nothing in the Report or in the Proceedings which even hints at the nature of these plans. No wonder Dr. Torrance made the remark "The report of this committee being as brief as it is, it is difficult to understand it!" In answer to Dr. Torrance's request for information as to these plans he was informed that the findings of the Committee and the Board would be published "prior to the next annual meeting when it is up for adoption." Fortunately there are several things which the Association may do about these findings other than adopting them or any part there-of.
- (2) The second point is much more important than the preceding one, since it involves a proposed action which is clearly in contravention of Article VI of the Constitution of the Association. The action referred to here is "that this report shall be considered as a written notice to the Association of a proposed revision of the Constitution and By-Laws at the next annual meeting." Anyone who will read Article VI will see at once that this violates in two respects the specific, and therefore the only way, in which amendments may lawfully be made. First, the notice will not have been made in writing "at an annual meeting," and

second, it is proposed to violate the provision that "such amendments shall not be acted upon until the next following annual meeting." I therefore protest emphatically against this proposed double violation of the Constitution, and express the hope that, if an attempt is made at the Montreal meeting to 'put it over,' it will meet another Verdun, this time on the soil of New France.

There is no intention here to discuss the merits or demerits of the present Constitution and By-Laws, on which something may be said later. May I suggest that we try, for a change, to live up to them as they are, as well as to the Rules of Order? I commend this idea especially to the officers and the Executive Board.

> Yours very truly, S. Sisson.

Columbus, Ohio, March 10, 1923.

HOG CHOLERA CELEBRATES

1923 is the 90th Anniversary of the appearance of hog cholera in the United States. Probably there are many people who will wonder why this unfortunate event should be commemorated, for like being poor, it is nothing to sit on the back fence and boast about. However, the fact that a preventable disease should hold sway for 90 years causing losses that total from 30 to 75 millions of dollars annually is a matter that deserves more than passing notice.

In the fourscore and ten years that the disease has been in existence in the United States every conceivable method has been tried for combatting it. This includes home remedies, quack preparations, proprietary compounds, and even the wonderful anti-hog cholera serum which has been in use for 15 years. Yet hog cholera is still one of the most serious animal diseases with which we have to contend today.

It is undoubtedly high time that the malady be attacked from another angle, and it is apparent that the 90th Anniversary of this dread disease in this country could be commemorated in a most fitting manner by the formulation of concrete plans to get rid of the scourge.

Hog cholera is in reality a self-eradicating disease. When denied new fuel, and this is easy to accomplish, it rapidly burns itself out, and only in exceptional instances is the infection harbored for any great length of time on premises. If the infection is not reintroduced into these localities, it is patent that they

will remain free from the disease. Therefore, it is obvious that steps must be taken to correct the practices whereby the infection is introduced into free territory.

In some localities the feeding of garbage, table refuse or kitchen swill containing bones, rinds or scraps of pork is the principal source of new outbreaks. In other districts, the introduction of sick or exposed hogs is mainly responsible for starting new centers of infection. Then again, in some places, by the abuse of the double treatment, new outbreaks are not only started, but centers of infection maintained. These are the factors responsible for practically all if not every new outbreak.

These three factors are inconsistent with sanitation and must be controlled if the disease is to be eliminated. It is feasible to control any or all of them. Either this will be done or in 2023 some one will be writing a sketch regarding the 190th Anniversary of the disease in the United States.

I. K. ATHERTON,

Inspector in Charge of Hog Cholera Work.

College Park, Md., March 14, 1923.

POSITION WANTED

TO THE EDITOR:

I have recently had a communication from a veterinarian in Austria who is desirous of obtaining a position as Assistant Professor in Pharmacology or assisting in general practice. He is unmarried and had had seven years experience in city and country practice. He has done scientific work in a vaccine laboratory and is a contributor to veterinary Journals. He has also studied or investigated paratyphus, Texas fever, acetonemia of cattle, acidosis of swine, lamziekte, encephalitis lethargica, louping ill of sheep, botulism, etc.

He would expect a "living wage" and as opportunities and proficiency develop, would desire a corresponding increase in order to save something. In addition to his native tongue, he knows French and has a fair knowledge of English.

I will be glad to put any one interested in direct communication with this veterinarian.

Very truly yours,

PIERRE A. FISH.

Ithaca, N. Y., March 20, 1923.

FROM ILLINOIS

A letter was recently received from a County Farm Bureau, in the State of Illinois. We had knowledge of the fact that the farm adviser connected with this particular Farm Bureau had been making himself obnoxious to and had been making considerable trouble for the veterinarians in his county. If this letter is a sample of the scientific emanations from this particular Farm Bureau, we do not wonder why veterinarians so frequently complain about the activities of these farm advisers. Needless to say, the request contained in the letter was declined, and the 50c in stamps returned. The letter follows:

"Dear Sirs:

Enclosed find 50c in stamps for which please send me book No. 61, 1922 in which is described the details for the administration of an interpatation of results in the subcuataneous intradermal and ophtalmic tuberculin tests alone and in double and triple combination.

Thanking you in advance for your information, I am

Most sincerely yours,"

BAD

Hawaii? Are you Hungary?

Yes Siam.

Come on, I'll Fiji.

WORSE

Electrician's Wife: "Watt's the meter? Wire you insulate?" Electrician: "I got shocked by a couple o' vamperes."—
'Ee-'Aw.

WORST

Man (in drug store): "I want some consecrated lye."

Druggist: "You mean concentrated lye."

Man: "It does nutmeg any difference. That's what I camphor. What does it sulphur?"

Druggist: "Fifteen scents. I never cinnamon with so much wit."

Man: "Well, I should myrrh, myrrh! Yet I ammonia novice at it."—Handy Hanson.

When an old negro of Joplin complained he had lost his dog, his employer asked why he didn't advertise for the animal.

"Dat wouldn't do no good," returned the old man. "Dat dog kain't read."—American Messenger.

MISCELLANEOUS

A REMARKABLE HEN

Through the kindness of Dr. L. I. Hines, of Spencer, Nebraska, we have received an account of a most remarkable hen, and the equally remarkable record she made during 1922. This wonderful bird, Katrina by name, holds forth at 307 Twelfth St., Crete, Nebraska. She began laying January 10, 1922, and in eighteen days had fifteen eggs to her credit. January 29th, she decided to hatch some chicks, and on February 19th brought forth a family of fourteen from fifteen eggs. She raised all of these, and at last reports, every one of the fourteen was laying.

Katrina started laving again April 4th, laving fourteen eggs in nineteen days, then decided to set again, and brought forth the second brood of fourteen fine chicks on May 14th. At this point trouble began. Evidently some of the other hens in the flock became very jealous of Katrina, and in regular female fashion, attacked Katrina, inflicting serious bodily damages. In fact, she was so seriously incapacitated, that the wife of the owner of Katrina advised the hatchet, but this treatment was not applied, when Katrina's former record was considered. Her owner administered to her wounds so well that she made a complete recovery, and on July 15th, started on her third hatch, this time producing sixteen eggs in twenty days, and by August 22nd, was clucking to a third broad of thirteen chicks. While raising these, she spent the time economically in moulting, and began laying again Oct. 10th. After laying eighteen eggs, she decided to finish up her 1922 record, by bringing forth the largest brood of all, which event occurred on December 22nd, when seventeen fine, healthy chicks made their appearance.

Katrina is now characterized as the "8½-pound, champion, White Rock, combined egg-producer and incubator." Records show that Katrina laid sixty-four eggs, hatched fifty-eight, and raised them all. From a financial standpoint, the value of her output for 1922 was \$35.25, not including the eggs laid by the pullets of the first brood.

For polishing nickel that has become discolored, a paste of talc or clay with diluted sulphuric acid answers better than many prepared polishes.

NECROLOGY

CHARLES M. ANDERSON

Dr. Charles M. Anderson, of North Portland, Oregon, died during the month of January, of heart disease. Dr. Anderson was born January 6, 1888, at Council Bluffs, Iowa. He graduated from the San Francisco Veterinary College in the year 1918, and joined the American Veterinary Medical Association in 1919. For a while he held the position of assistant in the laboratory of the United States Public Health Service, at San Francisco. Dr. Anderson was a member of the Oregon State Veterinary Medical Association.

MRS. J. F. BARNES

Mrs. Flora Lucretia Barnes, wife of Dr. J. F. Barnes, of Toledo, Ohio, passed away at her home, 715 Broadway, on January 28, 1923. Mrs. Barnes had been in poor health for some time, but the immediate cause of her death was hemorrhage of the brain.

Mrs. Barnes was born in Dunkirk, Ohio, November 19, 1858. She attended a number of the meetings of the American Veterinary Medical Association, with Dr. Barnes, the last being the meeting in New York City, in 1913. The body was laid to rest January 31, 1923, in the mausoleum on the City Boulevard, in Toledo.

JOSEPH M. SOMMERS

Mr. Joseph M. Sommers died suddenly at his home in Detroit, Michigan, on March 5, 1923, at the age of 54 years. Mr. Sommers had been in the employ of the Bureau of Animal Industry for over 26 years, having entered the service as a tagger, October 1, 1896. He was first assigned to Milwaukee, and on June 1, 1901, was transferred to Detroit. He successively held the positions of stock examiner, foreman of taggers, inspector's assistant, and in 1914 became a lay inspector, grade 2, under the reclassification. Veterinarians who have been members of the Detroit force in past years, will remember Mr. Sommers as a valuable and highly respected government employe.

DR. WILLIAM J. MILKS

Dr. William J. Milks, father of Dr. Howard J. Milks, of the New York State Veterinary College of Cornell University, died February 26, 1923, at his home in Johnson City, N. Y. He had been in poor health for sometime, and had been confined to his bed for about three weeks. Dr. Milks spent most of his professional life at Candor, N. Y.

MRS. JOHN T. GRUBER

Mrs. Marguerite G. Gruber, wife of Dr. John T. Gruber, died March 24, 1923, at the home, No. 871 Mt. Vernon Avenue, Marion, Ohio. She had been ill for over two years, and death was due to heart trouble. Mrs. Gruber was born in Pittsburgh, Pa., June 3, 1884, and had been a resident of Marion for 13 years. Funeral services were held March 26th.

As we are closing the forms for this number of the Journal, we are in receipt of information indicating the deaths of the following veterinarians: Drs. Roy Smith, of Eugene, Oregon; John Montgomery, of Anamosa, Iowa; and H. T. McNeal, of Sunbury, Pa. We hope to be able to publish the details in the May Journal.

PERSONAL

- Lt. E. M. Curley (U. P. '11) is stationed at Fort Des Moines, Iowa.
- Dr. S. H. Gilliland (U. P. '01) is reported to be sojourning in the south
- Dr. E. O. Smith (Chi. '18) has removed from Carlock, Ill., to Princeville, Ill.
- Dr. A. J. Clark (San F. '15) has removed from Chillicothe, Mo., to Sioux City, Iowa.
- Dr. A. G. G. Richardson (U. P. '94) is President of the Georgia State Veterinary Association.
- Dr. Augustus Berdan (N. Y.-Amer. '03) has been transferred from Seattle, Wash., to Pembina, N. Dak.
- Dr. W. A. Young (Iowa '19) is now located in Des Moines, Iowa, having removed from Cherokee, Iowa.
- Dr. John R. Mohler (U. P. '95) attended the recent convention of the Southern Cattlemen's Association.
- Dr. C. J. Marshall (U. P. '94) was recently elected a Trustee of Messiah Universalist Home of Philadelphia.
- Dr. W. J. Chynoweth (Corn. '19) is associated in practice with Dr. W. G. Hollingworth (Amer.), 411 Broadway, Utica, N. Y.

Dr. Werner Runge (Berl. '79) is chief of the Veterinary Bureau of the Department of Health for the City of Newark, N. J.

Dr. A. D. Goldhaft (U. P. '10) of Vineland, N. J., is planning the erection of a small animal hospital along strictly modern lines.

Dr. C. V. Noback (Corn. '11), who recently returned from South America, is now engaged in graduate work at Cornell University.

Dr. F. S. Ballard (Iowa '11) is now located at Ashton, Iowa. In a note to the Editor, he writes: "The first number (March) is O. K."

Dr. F. J. McNeal (Ont. '95) of Wilkes-Barre, Pa., in sending his check for dues, writes: "I would not want to be without the Journal."

Dr. S. Brenton (Ont.), of Detroit, Mich., was recently called to Lansing to attend a meeting of the Bovine Tuberculosis Eradication Committee.

Dr. S. A. Goldberg (Corn. '14) recently addressed the Tompkins County (N. Y.) Medical Society on "The Pathology of Deforming Arthritis."

Dr. J. N. Frost (Corn. '07) was a recent visitor at the University of Pennsylvania School of Veterinary Medicine, while enroute to Madison, N. J.

Hon. L. Whitney Watkins, of Manchester, Mich., has been appointed Commissioner of Agriculture of the State of Michigan, succeeding Hon. J. A. Doelle.

Dr. W. J. Lentz (U. P. '04), addressed the Chester County Veterinary Club, at West Chester, Pa., on February 8th, on the subject of "Small Animal Diseases."

Dr. H. T. Ludwig (O. S. U.) has been transferred from Detroit, Michigan, and is now located in Louisville, Ky. He gives his address as 1114 South 4th Street.

Dr. Frank K. Hanson (K. S. A. C. '19) has been placed in charge of disease-control work, for the Department of Agriculture, in the upper peninsula of Michigan.

Dr. Henry W. Turner (U. P. '93) addressed the regular meeting of the Conestoga Veterinary Club, in February, on the subject of "Preventive Medicine."

Dr. V. A. Moore has been appointed a member of the Advisory Council of the New York Health and Tuberculosis Demonstrations of the Milbank Memorial Fund.

Drs. J. G. Wills (Corn. '06) and J. C. Miller, of Albany, N. Y., were in Ithaca during "Farmers Week", February 12-17, held by the New York State College of Agriculture.

Dr. Ward Giltner (Corn. '06) is now a radio expert. He recently broadcasted from a station connected with one of the Detroit newspapers on the subject of "Bacteriology."

Dr. Russell A. Runnells (Mich. '16), of East Lansing, Mich., is again planning to spend a part of the summer in post-graduate work in pathology, at the University of Michigan.

Dr. John H. Winstanley (U. P. '10), recently addressed the students in vocational training at the Mansfield (Pa.) Normal School on the subject of "Diseases Affecting Farm Animals."

Dr. A. Stanley Schlingman (O. S. U. '11) has accepted a position with Parke, Davis and Company, as veterinary pathologist and bacteriologist in the Medical Research Laboratories.

Dr. Chas. H. Kitselman (U. P. '18), of the Department of Pathology, K. S. A. C., writes: "Couldn't get along without the A. V. M. A. JOURNAL. Best wishes for its continued success."

Dr. P. A. Fish (Corn. '99), the first editor of the JOURNAL after it was taken over by the Association, writes: "Your initial number was fully up to standard as to contents and mechanics."

Dr. H. C. H. Kernkamp (O. S. U. '14), is taking work in the Department of Pathology, in addition to his regular duties as a member of the Faculty of the Department of Agriculture, University of Minnesota.

Dr. Louis A. Klein (U. P. '97) attended a meeting of the committee on revising the regulations governing production of certified milk, appointed by the Association of Medical Milk Commissions, February 23-24.

The many friends of Dr. J. G. Rutherford (Ont. '79) will regret to learn of his serious illness. Dr. Rutherford was compelled to seek the temperate climate of a Pacific Coast resort, about the middle of February.

Dr. P. A. Fish (Corn. '99) and Dr. C. E. Hayden (Corn. '14) attended the meeting of the Western New York Branch of the Society for Experimental Medicine and Biology, held in Syracuse, N. Y., on February 17th.

The American Journal of Obstetrics and Gynecology, for November, 1922, contained an article by Dr. W. L. Williams, entitled, "Some Phases of Bovine

Genital Infections of Possible Interest to the Medical Profession."

Dr. Earl Sunderville (Corn. '08), of the Cornell faculty, is on leave for the present term. He expects to spend part of the time visiting other veterinary schools, and will also spend some time in study at Cornell University.

Dr. L. W. Carl, of Columbus, Ohio, has tendered his resignation as a member of the A. V. M. A. Dr. Carl is now District Manager of the Mutual Life of New York, with offices in the First National Bank Building, Columbus,

Dr. G. A. Johnson (Iowa), of Kansas City, Kans., has returned from a in to Florida, occasioned by the illness of his father. The latter is reported trip to Florida, occasioned by the illness of his father. to have made a very satisfactory recovery. Mrs. Johnson remained in Florida until early in March.

Dr. George Ticehurst, of Adams Center, N. Y., and Dr. M. L. Hannahs (U. P. '16), of Watertown, N. Y., have entered into a partnership under the firm name of Ticehurst and Hannahs, and are devoting particular attention to the diseases of cattle.

Dr. S. E. Douglas, of Mesa, Ariz., succeeded Dr. R. J. Hight (Chi. '07) as State Veterinarian of Arizona, on February 1st. Dr. Hight served as State Veterinarian for four years. Dr. Douglas is Secretary of the Arizona Veterinary Medical Association.

Dr. Carl W. Gay (Corn. '99), of Ohio State University, addressed the annual meeting of the Eastern States Guernsey Club, which was held at the Hotel Adelphi, Philadelphia, Pa., February 9, 1923. The subject of his address was "Some Fundamental Facts about Breeding Livestock.

Dr. Stephen Lockett (U. P. '06), who has been in the service of the Nevada Agriculture Experiment Station for a number of years has been appointed Government Veterinary Surgeon for the Island of Jamaica, and has gone to take charge of control work in connection with the outbreak of foot and mouth disease, which has been prevalent on that Island for several months.

Among the veterinarians who attended the Agricultural Conference called by Governor Pinchot, at Harrisburg, Pa., on February 20th and 21st, 1923, were: Drs. M. F. Barnes (U. P. '11), H. R. Church (Ont. '92), G. A. Dick (U. P. '04), W. A. Haines (U. P. '07), H. N. Havner (Iowa '11), F. A. Marshall (Ind. '06), T. E. Munce (U. P. '04), J. N. Rosenberger (U. P. '10), and E. L. Stubbs (U. P. '11).

Dr. J. I. Gibson (Ont. '87), of South St. Joseph, Mo., writes that he was pleased with the March edition fo the JOURNAL, and that he is planning to attend the meeting in Montreal, Dr. Gibson will also visit his mother, brothers and sisters, who live in Ottawa. Incidentally he mentioned the fact that Des Moines, "the best convention city in the West," will make another bid this year for the 1924 meeting of the A. V. M. A.

Veterinarians contributed liberally to the program of "Farmers Week, held by the New York State College of Agriculture, at Ithaca, February 12th to 17th. Dr. J. N. Frost (Corn. '07) participated in a round-table discussion dealing with poultry barn arrangement, construction and ventilation. Dr. H. J. Metzger led a discussion on "Tuberculosis." Dr. R. R. Birch (Corn. 12) spoke on "Abortion and Related Troubles." Dr. W. A. Hagan (Kan. 16) discussed "Internal Parasites of Poultry." Dr. J. W. Fuller took part in the discussion relating to "Poultry Diseases and Sanitation."

